UNIT TERMINAL OBJECTIVE

6-1 At the completion of this unit, the EMT-Intermediate student will be able to apply utilize the assessment findings to formulate and implement a treatment plan for a normal or abnormal labor.

COGNITIVE OBJECTIVES

At the completion of this unit, the EMT-Intermediate student will be able to:

6-1.1 Review the anatomic structures and physiology of the reproductive system. (C-1)
6-1.2 Identify the normal events of pregnancy. (C-1)
6-1.3 Describe how to assess an obstetrical patient. (C-1)
6-1.4 Identify the stages of labor and the EMT-Intermediate's role in each stage. (C-1)
6-1.5 Differentiate between normal and abnormal delivery. (C-3)
6-1.6 Identify and describe complications associated with pregnancy and delivery. (C-1)
6-1.7 Identify predelivery emergencies. (C-1)
6-1.8 State indications of an imminent delivery. (C-1)
6-1.9 Differentiate the management of a patient with predelivery emergencies from a normal delivery. (C-3)
6-1.10 State the steps in the predelivery preparation of the mother. (C-1)
6-1.11 State the steps to assist in the delivery of a newborn. (C-1)
6-1.12 Describe how to care for the newborn. (C-1)
6-1.13 Describe how and when to cut the umbilical cord. (C-1)
6-1.14 Discuss the steps in the delivery of the placenta. (C-1)
6-1.15 Describe the management of the mother post-delivery. (C-1)
6-1.16 Describe the procedures for handling abnormal deliveries. (C-1)
6-1.17 Describe the procedures for handling complications of pregnancy. (C-1)
6-1.18 Describe the procedures for handling maternal complications of labor. (C-1)
6-1.19 Describe special considerations when meconium is present in amniotic fluid or during delivery. (C-1)
6-1.20 Describe special considerations of a premature baby. (C-1)

AFFECTIVE OBJECTIVES

At the completion of this unit, the EMT-Intermediate student will be able to:

6-1.21 Advocate the need for treating two patients (mother and baby). (A-2)
6-1.22 Value the importance of maintaining a patient’s modesty and privacy during assessment and management. (A-2)
6-1.23 Serve as a role model for other EMS providers when discussing or performing the steps of childbirth. (A-3)
6-1.24 Value the importance of body substance insolation. (A-2)

PSYCHOMOTOR OBJECTIVES

At the completion of this unit, the EMT-Intermediate student will be able to:

6-1.25 Demonstrate how to assess an obstetric patient. (P-2)
6-1.26 Demonstrate how to provide care for a patient with: (P-2)
 a. Excessive vaginal bleeding
 b. Abdominal pain
6-1.27 Demonstrate how to prepare the obstetric patient for delivery. (P-2)
6-1.28 Demonstrate how to assist in the normal cephalic delivery of the fetus. (P-2)
6-1.29 Demonstrate how to deliver the placenta. (P-2)
6-1.30 Demonstrate how to provide post-delivery care of the mother. (P-2)
6-1.31 Demonstrate how to assist with abnormal deliveries. (P-2)

6-1.32 Demonstrate how to care for the mother with delivery complications. (P-2)

DECLARATIVE

I. Introduction
    A. Pregnancy results from ovulation and fertilization
        1. Most pregnancies are uncomplicated
        2. Complications can occur
            a. Eclampsia/ pre-eclampsia
            b. Diabetes
            c. Hypotension/ hypertension
            d. Cardiac disorders
            e. Abortion
            f. Trauma
            g. Placenta abnormalities
    B. Childbirth involves labor and delivery
        1. Childbirth is a natural process, often only requiring basic assistance
        2. Throughout the process, the EMT-Intermediate is caring for two patients, not one
        3. Complications can occur
            a. Breech/ limb presentation
            b. Multiple births
            c. Umbilical cord problems
            d. Disproportion
            e. Excessive bleeding
            f. Neonate requiring resuscitation
            g. Preterm labor

II. Review the anatomy and physiology of the female reproductive system
    A. Normal events of pregnancy
        1. Ovulation
        2. Fertilization
            a. Occurs in distal third of fallopian tube
        3. Implantation
            a. Occurs in the uterus
    B. Accessory structures of pregnancy
        1. Placenta
            a. Transfer of gases
                (1) Oxygen and carbon dioxide
            b. Transport nutrients
            c. Excretion of wastes
            d. Hormone production
                (1) Placenta acts as temporary endocrine gland
                (2) Secretes estrogen, progesterone, etc.
                    (a) Prevents menses
                    (b) Causes anatomical changes in preparation of childbirth
            e. Protection
                (1) Provides partial barrier against harmful substances
                (2) Does not protect against steroids, narcotics, some antibiotics
        2. Umbilical cord
            a. Connects placenta to fetus
            b. Contains two arteries and one vein
        3. Amniotic sac and fluid

a. Membrane surrounding fetus
b. Fluid originates from fetal sources - urine, secretions
c. Between 500 and 1000 cc's of fluid after 20 weeks
d. Rupture of the membrane produces watery discharge

C. Fetal growth process
1. End of 3rd month
a. Sex may be distinguished
b. Heart is beating
c. Every structure found at birth is present
2. End of 5th month
a. Fetal heart tones can be detected
b. Fetal movement may be felt by the mother
3. End of 6th month
a. May be capable of survival if born prematurely
4. Approximately middle of 10th month
a. Considered to have reached full term
b. Expected date of confinement (EDC)

D. Obstetric terminology
1. Antepartum - before delivery
2. Postpartum - after delivery
3. Prenatal - existing or occurring before birth
4. Natal - connected with birth
5. Gravida - number of pregnancies
6. Para - number of pregnancies carried to full term
7. Primigravida - a woman who is pregnant for the first time
8. Primipara - a woman who has given birth to her first child
9. Multiparous - a woman who has given birth multiple times
10. Gestation - period of time for intrauterine fetal development

III. General assessment of the obstetric patient
A. Initial assessment
B. History of present illness
1. SAMPLE
a. Pertinent medical history
(1) Diabetes
(2) Heart disease
(3) Hypertension/ hypotension
(4) Seizures
2. Current health of patient
a. Pre-existing conditions
b. Prenatal care
(1) None
(2) Physician
(3) Nurse midwife
c. Illicit drug use

C. Obstetrical history
1. Length of gestation
2. Primipara or multiparous
3. Previous cesarean sections
4. Previous gynecologic or obstetric complications

5. Contractions
6. Patient states that "the baby is coming"
7. Anticipating normal delivery (versus multiple births, etc.)
8. Pain
    a. OPQRST
9. Vaginal bleeding
    a. Presence
    b. Amount
    c. Color
    d. Duration
10. Vaginal discharge
    a. Presence
    b. Amount
    c. Color
    d. Duration

D. Physical examination
1. Comforting attitude and approach
    a. Protect patient modesty
    b. Maintain privacy
    c. Be considerate of reasons for patient discomfort
2. Vital signs
    a. Consider orthostatic
3. Genital inspection
    a. When indicated
    b. Visually inspect for crowning and/ or vaginal bleeding

IV. General management of the obstetric patient

A. Body substance insolation

B. Basic treatment modalities
1. Airway and ventilatory support
    a. Administer oxygen
        (1) High flow, high concentration PRN
2. Circulatory support
3. Pharmacological interventions
    a. IV access
        (1) Large bore
        (2) Volume expander
        (3) Consider second line
4. Non-pharmacologic interventions
    a. Position of comfort and care
        (1) Left lateral recumbent after the 24th week, if not in active labor
    b. Monitor cardiac rhythm
    c. Evaluate the fetus status if possible
    d. Treat for hypotension if necessary
5. Transport considerations
    a. Emergently
6. Psychological support/ communications strategies
    a. Calm approach
    b. Maintain modesty/ privacy

V. Specific complications of pregnancy
- A. Trauma
  - 1. Minor trauma common in the obstetric patient
    - a. Reasons
      - (1) Syncopal episodes
      - (2) Diminished coordination
      - (3) Loosening of the joints
  - 2. Major trauma
    - a. Susceptible to a life-threatening episode due to increased vascularity
      - (1) May deteriorate suddenly
  - 3. Abdominal trauma
    - a. Premature separation of the placenta
    - b. Premature labor
    - c. Abortion
    - d. Rupture of the uterus
    - e. Fetal death
      - (1) Death of the mother
      - (2) Separation of the placenta
      - (3) Maternal shock
      - (4) Uterine rupture
      - (5) Fetal head injury
- B. Vaginal bleeding
  - 1. Abortion/ miscarriage
    - a. Classifications
      - (1) Complete
        - (a) Uterus completely evacuates fetus, placenta, and decidual lining
      - (2) Incomplete
        - (a) Some placental tissue remaining in uterus after expulsion of fetus
      - (3) Spontaneous
        - (a) Occur before 20th week, due to maternal or ovular defects
      - (4) Criminal
        - (a) Intentional ending of pregnancy under any condition not allowed by law
      - (5) Therapeutic
        - (a) End pregnancy as thought necessary by a physician
      - (6) Threatened
        - (a) Vaginal bleeding during first half of pregnancy
      - (7) Inevitable
        - (a) Severe cramping and cervix effacement and dilation
        - (b) Attempts to maintain pregnancy are useless; changes are irreversible
    - b. Incidence
      - (1) Assume during first and second trimester of known pregnancy
    - c. Specific assessment findings
      - (1) Additional history
        - (a) Statement that she has recently passed tissue vaginally
        - (b) Complaint of abdominal pain and cramping
        - (c) History of similar events
      - (2) Additional physical examination

(a) Evaluate impending shock - check orthostatic vital signs
(b) Presence and volume of vaginal blood
(c) Presence of tissue or large clots

d. Transport considerations
(1) Collect and transport any passed tissue, if possible

e. Psychological support/ communications strategies
(1) Emotional support extremely important

2. Ectopic pregnancy
a. Incidence
(1) Approximately 1 of every 200 pregnancies
(2) Most are symptomatic and/ or detected 2-12 weeks gestation

b. Cause
(1) Ovum develops outside the uterus
(a) Previous surgical adhesions
(b) Pelvic inflammatory disease
(c) Tubal ligation
(d) Use of an IUD

c. Organs affected
(1) Fallopian tube

d. Complications
(1) May be life-threatening
(2) May lead to hypovolemic shock and death

e. Specific assessment findings
(1) Severe abdominal pain, may radiate to back
(2) Amenorrhea - absence of monthly blood flow and discharge
(3) Vaginal bleeding absent or minimal
(4) Upon rupture, bleeding may be excessive
(5) Shock signs and symptoms
(6) Additional history
(a) Previous surgical adhesions
(b) Pelvic inflammatory disease
(c) Tubal ligation
(d) Use of an IUD
(e) Previous ectopic pregnancy
(7) Additional physical examination
(a) Check for impending shock - orthostatic vital signs
(b) Presence and volume of vaginal blood

f. Additional management
(1) See "general management"
(2) Second large bore IV line
(3) Trendelenburg, if shock impending

g. Transport considerations
(1) Emergency transport to nearest surgically-capable facility

h. Psychological support/ communications strategies

3. Placenta previa
a. Incidence
(1) About 1 in 300
(2) Higher in preterm births

b. Cause
(1) Placenta implantation in lower uterus; covering cervix opening

(2) Associate with increasing age, multiparity, previous cesarean sections, intercourse
c. Organs affected
(1) Placenta, uterus
d. Complications
(1) Placental insufficiency and fetal hypoxia
e. Specific assessment findings
(1) Bright red blood flow without pain or uterine contractions
f. Transport considerations
(1) Emergency transport to appropriate facility
(2) Definitive treatment is cesarean section
g. Psychological support/ communications strategies
4. Abruptio placenta
a. Incidence
(1) Occurs in up to 2% of pregnancies
(2) Occurs in 1 in 200 deliveries
(3) 1 out of 400 fetal deaths
(4) Typically a third trimester complication
(5) Associated with hypertension, pre-eclampsia, trauma, multiparity
b. Cause
(1) Premature separation of placenta from uterus
c. Organs affected
(1) Placenta, uterus
d. Complications
(1) Fetal hypoxia and death
e. Specific assessment findings
(1) Third trimester bleeding
(2) Acute alteration in the contraction pattern
(3) Uterus becomes tender
(4) Uterus becomes board-like if hemorrhage retained
(5) Symptoms of shock inconsistent with amount of visible bleeding
f. Transport considerations
(1) Assess fetal heart tones often
(2) Transport in LLR position unless Trendelenburg is indicated
(3) Emergency transport to appropriate facility
(4) Definitive treatment is cesarean section
g. Psychological support/ communications strategies
C. Complications of pregnancy
1. Exacerbation of pre-existing medical conditions
a. Diabetes
(1) May become unstable during pregnancy
(2) Higher incidence of coma
b. Hypertension
(1) May be complicated by pre-eclampsia/ eclampsia
(2) More susceptible to additional complications
(a) Cerebral hemorrhage
(b) Cardiac failure
(c) Renal failure
c. Neuromuscular disorders
(1) May be aggravated by pregnancy

d. Cardiac disorders
   (1) Additional stress on the heart
      (a) Cardiac output increases 30% by week 34

2. Medical complications of pregnancy
   a. Toxemia (pre-eclampsia/ eclampsia)
      (1) Incidence
         (a) Serious condition
         (b) Pregnancy induced hypertension (PIH)

      (2) Cause
         (a) Associated with first birth, multiple births, excessive amniotic fluid
         (b) Pre-existing conditions
            i) Hypertension
            ii) Renal disease
            iii) Diabetes
      (3) Organs affected
      (4) Complications
         (a) Convulsions seriously threaten the fetus by abruptio placenta
      (5) Specific assessment findings
         (a) Occurs in the last trimester of pregnancy
         (b) Pre-eclampsia is non-convulsive state of toxemia
         (c) Pre-eclampsia has two of the following three signs
            i) Hypertension (BP > 140/90 - acute systolic rise > 20 and diastolic rise > 10)
            ii) Fluid retention with excessive weight gain
            iii) Proteinuria
         (d) Eclampsia includes convulsions
         (e) Additional history
            i) Hypertension
            ii) Excessive weight gain with edema and/ or seizures
         (f) Additional physical exam
            i) Headaches and/ or epigastric pain; possible seizure
            ii) Visual problems
      (6) Transport considerations
         (a) If a seizure has not occurred
            i) Keep patient calm and quiet
            ii) IV access
            iii) Darken ambulance
            iv) Position patient LLR
            v) Transport gently
            vi) Minimize stimuli to avoid precipitating seizure
         (b) If a seizure is occurring
            i) IV access
            ii) Consider the administration of 5 to 10 mg of diazepam IV push
         (c) Emergency transport to appropriate facility
         (d) Definitive treatment is cesarean section
      (7) Psychological support/ communications strategies
   b. Diabetes

(1) Can be caused by pregnancy
c. Supine-hypotensive syndrome
(1) Incidence
(a) Occurs near term
(2) Cause
(a) Abdominal mass compresses the inferior vena cava
i) Reduces pre-load and thereby cardiac output
(3) Organs affected
(4) Complications
(5) Specific assessment findings
(a) Check to see if volume depletion is the problem
(b) Additional history
i) Recent medical history including diarrhea, vomiting
ii) Problem coincidental to supine positioning
(c) Additional physical exam
i) Orthostatic vital signs
ii) Tenting of skin
(6) Management
(7) Transport considerations
(a) If not volume depletion
i) Transport LLR
(b) If possibility of volume depletion
i) Consider 2 large bore IVS
ii) Volume replacement
iii) Transport LLR as precaution
(8) Psychological support/ communications strategies

3. Braxton-Hicks contractions
a. Incidence
(1) Benign phenomenon that simulates labor
(2) Usually occurs after the third month of pregnancy
b. Specific assessment findings
(1) Contractions are generally painless and may be helped by walking
c. Management
(1) Transport considerations
(2) Psychological support/ communications strategies

4. Preterm labor
a. Labor that begins prior to 38 weeks gestation
b. Incidence
(1) Incidence varies with age, presence of multiple gestations, and other risk factors
c. Causes
(1) Physiologic abnormalities (multiple factors)
(2) Uterine or cervical anatomical abnormalities
(3) Premature rupture of membranes
(4) Multiple gestations
(5) Intrauterine infections
d. Complications
(1) Premature delivery of infant
e. Specific assessment findings
(1) Contractions that result in the progressive dilation or effacement of the

cervix (not a field assessment)
(2) May be difficult to differentiate labor from Braxton-Hicks contractions (false labor)
f. Management
(1) Transport considerations
(a) Requires transport for evaluation and treatment by an appropriate health care provider
g. Psychological support/ communications strategies

VI. Normal childbirth
A. Characteristics of labor
1. Discomfort in the back and/ or the abdomen
2. Contractions occurring at regular intervals
a. Increasing frequency and intensity of contractions
b. Time from the beginning of one contraction to the beginning of the next
B. Stages of labor
1. Stage I (Dilatation stage)
a. Onset of regular uterine contractions to complete cervical dilation
b. Average time
(1) 12.5 hours in primipara
(2) 7 hours in multipara
2. Stage II (Expulsion stage)
a. Full dilatation of the cervix to the delivery of the newborn
b. Average time
(1) 80 minutes in a primipara
(2) 30 minutes in a multipara
3. Stage III (Placental stage)
a. Immediately following delivery of the baby until expulsion of the placenta
b. Average time
(1) 5 to 20 minutes
C. Progression of labor
1. First stage of labor
a. Contractions
(1) Typically begin short and gently
(2) Occur at intervals of ten to fifteen minutes
b. Effacement
(1) Thinning and shortening of the cervix
c. Cervical dilation
(1) Stretching of the opening of the cervix to accommodate baby
2. Second stage of labor
a. Contractions
(1) Stronger and longer
(2) Lasting 50-70 seconds
(3) Occurring at intervals of 2-3 minutes
b. Amniotic sac typically ruptures
c. Urge to bear down or push becomes very strong
d. Crowning
(1) Largest part of the fetal head is visible
D. Delivery process
1. The decision to transport

a. Related to the imminence of delivery
(1) Number of pregnancies
(a) Labor is shortened with multiparity
(2) Frequency of contractions
(a) Two minutes apart may signal imminent delivery
(3) Maternal urge to push
(a) Desire to push signals imminent delivery
(4) Crowning of the presenting part
(a) Imminent delivery
b. Related to the presence of complications
(1) Abnormal presentation
(2) Fetal distress
(3) Multiple births

2. Delivery of the newborn
a. Prepare a delivery area
(1) Clean, adequate space
b. Provide oxygen to the mother
(1) Nonrebreather or nasal cannula
c. Establish an IV
(1) KVO/ TKO rate
d. Position mother on her back and drape appropriately
e. Monitor the fetal heart rate, if time allows
f. Coach the mother in breathing patterns
g. Encourage mother to push with contractions
h. Establish body substance isolation
i. Control the delivery of the fetal head
(1) Apply gentle hand pressure on the head
(2) Beware of fontanelle
(3) Support the head as it delivers
j. Tear amniotic sac if it continues to cover the baby's head
(1) Permits escape of amniotic fluid
(2) Allows the newborn to start breathing
k. Check for the presence of the umbilical cord wrapped around the neck
(1) Carefully remove it
l. Suction the neonate’s mouth and nose
m. Provide support as the head rotates and the shoulders deliver
(1) Keep the neonate’s head above the level of the vagina
n. Clamp the umbilical cord
(1) First clamp approximately 4 inches from the neonate
(2) Second clamp approximately 6 inches from the neonate
(3) Cut the cord between the two clamps
o. Support and evaluate the neonate following delivery

3. Delivery of the placenta
a. Usually occurs 5-20 minutes after delivery of neonate
b. Do not delay transport to wait for the delivery of the placenta
c. If it delivers, place the placenta in a plastic bag

E. Additional care
1. Care for the mother
a. Excessive bleeding
(1) Perform fundal massage of the uterus

(a) Stimulates contraction
(b) Breast feeding stimulates contraction of the uterus
(2) Manage any perineal tears by direct pressure
b. Observe and monitor the mother
(1) Signs of hemorrhage and stability of pulse and blood pressure
2. Neonate care

VII. Routine care of the neonate (for more detail, see neonatology unit)
A. Care within first minute following delivery
1. Support the newborn
2. Position the newborn on his/ her side on warm clean object, such as sterile towels
3. Clear airway
a. Repeat suction of the nose and mouth
b. Wipe away secretions with sterile gauze
4. Dry
5. Maintain warmth
6. Tactile stimulation
7. Evaluate the newborn using APGAR scoring

VIII. Abnormal deliveries
A. Breech presentation
1. Incidence
a. Most common in premature births and uterine abnormalities
2. Assessment
a. Feet or buttocks are presenting part
3. Management
a. Shoulders, not the head, are normally the difficult part to deliver
b. If delivering
(1) Allow neonate to deliver to the umbilicus
(2) With the legs clear, support the body in palm
(3) Extract approximately 4-6 inch loop of umbilical cord
(4) Rotate neonate for anterior-posterior shoulder positioning
(5) Apply gentle traction until axilla visible
(6) Guide neonate upward and deliver posterior shoulder
(7) Guide neonate downward to deliver anterior shoulder
(8) Ease the head out, do not apply excessive manipulation
c. If head does not deliver
(1) Form V with fingers on sides of neonate's nose
(a) Creates airway
B. Umbilical cord presentation
1. Incidence
a. Approximately 1 in 200 pregnancies
b. Suspect when fetal distress present
c. Contributing factors include breech birth, multiple births, large fetus
2. Assessment
a. Portion of cord visible, protruding through vagina
3. Management
a. Position mother with hips elevated
(1) Trendelenburg
(2) Knee-chest

b. Mother should pant with contractions to avoid bearing down
c. Use gloved hand to hold fetus in vagina
d. Keep pressure off cord

C. Limb presentation
1. Incidence
2. Assessment
a. Limb presents through vagina
3. Management
a. Emergency transport
b. Cesarean section delivery

D. Multiple births
1. Incidence
a. Twins occur in about 1 in every 90 births
b. Approximately 40% of twin deliveries are premature
2. Assessment
a. Mother may not know
b. First sign may be additional contractions and need to push
3. Management
a. Deliver in same manner as individual delivery
b. Need additional supplies

E. Cephalopelvic disproportion
1. Incidence
a. Small pelvis
b. Fetal abnormalities
c. Mother often primigravida
2. Assessment
a. Lack of progress through stages of delivery
b. Frequent, prolonged contractions
3. Management
a. Cesarean delivery necessary to avoid uterine rupture
b. Oxygenation, ventilation, circulatory support
c. Emergency transport

F. Meconium staining
1. Meconium in amniotic fluid
a. Could be aspirated
2. Incidence
a. Between 8 and 30% of deliveries
b. Increased perinatal mortality
3. Assessment
a. Color varies from yellow, light green, or dark green (pea soup)
b. The thicker and darker the fluid, the higher the risk of morbidity
4. Management
a. Prepare for intubation
b. Clear airway/ thoroughly suction
(1) Mouth, pharynx, nose
(2) Direct visualization and suction of hypopharynx
c. Intubate
(1) Suction proximal end of endotracheal tube

G. Maternal complications of labor and delivery
1. Postpartum hemorrhage

a. Loss of more than 500 cc's of blood immediately following delivery
b. May be caused by
   (1) Lack of uterine tone
   (2) Vaginal or cervical tears
   (3) Retained pieces of the placenta
   (4) Clotting disorders
c. Incidence
d. Assessment
   (1) History
      (a) Large infant
      (b) Multiple births have occurred
      (c) The patient has had placenta previa
      (d) The patient has had abruptio placenta
      (e) The patient has had prolonged labor
   (2) Physical examination
      (a) Treat the patient, EMT-Intermediate must rely on the patient's clinical appearance and vital signs
      (b) The uterus feels soft on palpation
      (c) Inspect the external genitalia for injury resulting in excessive bleeding
      (d) Observe for signs and symptoms of hypovolemic shock
e. Management
   (1) Airway and ventilatory support
      (a) High flow, high concentration oxygen
   (2) Circulatory support
   (3) Pharmacologic interventions
      (a) Consider 2 large-bore IV's for volume replacement
   (4) Non-pharmacologic interventions
      (a) Place the infant at the mother's breast if just delivered
      (b) Provide uterine massage
      (c) Do not attempt to force delivery of the placenta
      (d) Do not pack the vagina
   (5) Transport considerations
      (a) Emergent transport of the patient
   (6) Psycological support/ communications strategies

UNIT TERMINAL OBJECTIVE

6-2 At the completion of this unit, the EMT-Intermediate student will be able to utilize assessment findings to formulate a field impression and implement the treatment plan for the resuscitation of a neonatal patient.

COGNITIVE OBJECTIVES

At the completion of this unit, the EMT-Intermediate student will be able to:

6-2.1 Define the term newborn. (C-1)
6-2.2 Define the term neonate. (C-1)
6-2.3 Identify important antepartum factors that can affect childbirth. (C-1)
6-2.4 Identify important intrapartum factors that can term the newborn high risk. (C-1)
6-2.5 Identify the primary signs utilized for evaluating a newborn during resuscitation. (C-1)
6-2.6 Formulate an appropriate treatment plan for providing initial care to a newborn. (C-3)
6-2.7 Identify the appropriate use of the APGAR score in caring for a newborn. (C-1)
6-2.8 Calculate the APGAR score given various newborn situations. (C-3)
6-2.9 Determine when ventilatory assistance is appropriate for a newborn. (C-1)
6-2.10 Prepare appropriate ventilation equipment, adjuncts and technique for a newborn. (C-1)
6-2.11 Determine when chest compressions are appropriate for a newborn. (C-1)
6-2.12 Discuss appropriate chest compression techniques for a newborn. (C-1)
6-2.13 Reassess a patient following chest compressions and ventilations. (C-1)
6-2.14 Determine when blow-by oxygen delivery is appropriate for a newborn. (C-1)
6-2.15 Discuss appropriate blow-by oxygen delivery devices and technique for a newborn. (C-1)
6-2.16 Assess patient improvement due to assisted ventilations. (C-1)
6-2.17 Discuss the initial steps in resuscitation of a newborn. (C-1)
6-2.18 Assess patient improvement due to blow-by oxygen delivery. (C-1)
6-2.19 Discuss appropriate transport guidelines for a newborn. (C-1)
6-2.20 Describe the epidemiology, including the incidence, morbidity/ mortality and risk factors for meconium aspiration in the neonate. (C-1)
6-2.21 Discuss the pathophysiology of meconium aspiration in the neonate. (C-1)
6-2.22 Discuss the assessment findings associated with meconium aspiration in the neonate. (C-1)
6-2.23 Discuss the management/ treatment plan for meconium aspiration in the neonate. (C-1)
6-2.24 Describe the epidemiology, including the incidence, morbidity/ mortality and risk factors for bradycardia in the neonate. (C-1)
6-2.25 Discuss the pathophysiology of bradycardia in the neonate. (C-1)
6-2.26 Discuss the assessment findings associated with bradycardia in the neonate. (C-1)
6-2.27 Discuss the management/ treatment plan for bradycardia in the neonate. (C-1)
6-2.28 Describe the epidemiology, including the incidence, morbidity/ mortality, and risk factors for respiratory distress/ cyanosis in the neonate. (C-1)
6-2.29 Discuss the pathophysiology of respiratory distress/ cyanosis in the neonate. (C-1)
6-2.30 Discuss the assessment findings associated with respiratory distress/ cyanosis in the neonate. (C-1)
6-2.31 Discuss the management/ treatment plan for respiratory distress/ cyanosis in the neonate. (C-1)
6-2.32 Describe the epidemiology, including the incidence, morbidity/ mortality, and risk factors for hypothermia in the neonate. (C-1)
6-2.33 Discuss the pathophysiology of hypothermia in the neonate. (C-1)
6-2.34 Discuss the assessment findings associated with hypothermia in the neonate. (C-1)
6-2.35 Discuss the management/ treatment plan for hypothermia in the neonate. (C-1)
6-2.36 Describe the epidemiology, including the incidence, morbidity/ mortality, and risk factors for cardiac arrest in the neonate. (C-1)
6-2.37 Discuss the pathophysiology of cardiac arrest in the neonate. (C-1)
6-2.38 Discuss the assessment findings associated with cardiac arrest in the neonate. (C-1)

6-2.39 Discuss the management/ treatment plan for cardiac arrest in the neonate. (C-1)

AFFECTIVE OBJECTIVES

At the completion of this unit, the EMT-Intermediate student will be able to:

6-1.40 Demonstrate and advocate appropriate interaction with a newborn/ neonate that conveys respect for their position in life. (A-3)
6-1.41 Recognize the emotional impact of newborn/ neonate injuries/ illnesses on parents/ guardians. (A-1)
6-1.42 Recognize and appreciate the physical and emotional difficulties associated with separation of the parent/ guardian and a newborn/ neonate. (A-3)
6-1.43 Listen to the concerns expressed by parents/ guardians. (A-1)
6-1.44 Attend to the need for reassurance, empathy and compassion for the parent/ guardian. (A-1)

PSYCHOMOTOR OBJECTIVES

At the completion of this unit, the EMT-Intermediate student will be able to:

6-2.45 Demonstrate preparation of a newborn resuscitation area. (P-2)
6-2.46 Demonstrate appropriate assessment technique for examining a newborn. (P-2)
6-2.47 Demonstrate appropriate assisted ventilations for a newborn. (P-2)
6-2.48 Demonstrate appropriate insertion of an orogastric tube. (P-2)
6-2.49 Demonstrate appropriate chest compression and ventilation technique for a newborn. (P-2)
6-2.50 Demonstrate the initial steps in resuscitation of a newborn. (P-2)
6-2.51 Demonstrate blow-by oxygen delivery for a newborn. (P-2)

DECLARATIVE

I. Introduction
   A. Newborn
      1. A recently born infant; usually considered the first few hours of life
   B. Neonate
      1. Considered the first 28 days of life

II. General pathophysiology, assessment, and management
   A. Epidemiology
      1. Incidence
         a. Approximately 6% of deliveries require life support
         b. Incidence of complications increases as birth weight decreases
      2. Risk factors
         a. Antepartum factors
            (1) Multiple gestation
            (2) Inadequate prenatal care
            (3) Mother's age <16 or >35
            (4) History of perinatal morbidity or mortality
            (5) Post-term gestation
            (6) Drugs/ medications
            (7) Toxemia, hypertension, diabetes
         b. Intrapartum factors
            (1) Premature labor
            (2) Meconium-stained amniotic fluid
            (3) Rupture of membranes greater than 24 hours prior to delivery
            (4) Use of narcotics within four hours of delivery
            (5) Abnormal presentation
            (6) Prolonged labor or precipitous delivery
            (7) Prolapsed cord
            (8) Bleeding
      3. Treatment strategies
         a. Preparation of resuscitation equipment
         b. Determine appropriate destination
   B. Pathophysiology
      1. Transition from fetal to neonatal circulation
      2. Respiratory system must suddenly initiate and maintain oxygenation
      3. Infants are very sensitive to hypoxia
      4. Permanent brain damage will occur with hypoxemia
      5. Apnea in newborns
      6. Congenital anomalies
   C. Assessment
      1. Time of delivery
      2. Normal/ abnormal vital signs
      3. Airway and ventilation
         a. Respiratory rate
            (1) Normal
            (2) Rhythm
            (3) Crying
            (4) Apneic

b. Respiratory effort
(1) Normal
(2) Retractions
(3) Grunting
(4) Nasal flaring
(5) Periodic breathing
(6) Lung sounds

4. Circulation
a. Heart rate
(1) Normal
b. Color/ cyanosis
(1) Normal
(2) Central versus peripheral
(3) Mucosal membranes
c. End organ perfusion
(1) Compare strength of central pulses versus peripheral
(2) Capillary refill

5. APGAR
a. **A**ppearance - skin color
(1) Completely pink - 2
(2) Body pink, extremities blue - 1
(3) Blue, pale - 0
b. **P**ulse rate
(1) Above 100 - 2
(2) Below 100 - 1
(3) Absent - 0
c. **G**rimace - irritability
(1) Cries - 2
(2) Grimaces - 1
(3) No response - 0
d. **A**ctivity - muscle tone
(1) Active motion - 2
(2) Some flexion of extremities - 1
(3) Limp - 0
e. **R**espiratory - effort
(1) Strong cry - 2
(2) Slow and irregular - 1
(3) Absent - 0

D. Treatment
1. Prior to delivery, prepare environment and equipment
2. During delivery, suction mouth and nose as head delivers
3. After delivery
a. Airway and ventilatory support
(1) Drying
(a) Head and face
(b) Body
(2) Warming
(a) Appropriate techniques
(3) Position
(4) Suction

(a) Technique
i) Mouth first, than nares
ii) Nasal suctioning is a stimulus to breathe
(b) Equipment
i) Bulb suction
ii) Suction catheters
iii) Meconium aspirator
(5) Stimulation
(a) Flicking soles of feet
(b) Stroking back
(6) Blow-by oxygen
(a) Never withhold oxygen
(b) Oxygen should be warmed
(c) Use when
i) Newborn is cyanotic and
ii) Heart rate greater than 100 and
iii) Adequate respiratory rate and effort
(d) 5 liters/ minute maximum
i) Complications due to hypothermia
(e) Appropriate techniques
(7) Oral airways - rarely used for neonates
(a) Necessary to keep mouth open for ventilation
(8) Bag-valve-mask
(a) Mask characteristics
i) Appropriate size
ii) Minimize dead space
(b) Bag characteristics
i) Pop-off valve should be disabled
(c) Use when
i) Apneic
ii) Inadequate respiratory rate or effort
iii) Heart rate less than 100
(d) Technique
i) Initial ventilations require higher pressure to expand lungs
(9) Gastric decompression
(a) Abdominal distention is impeding ventilation
(b) Presence of diaphragmatic hernia

b. Circulation
(1) Intraosseous cannulation
(2) Chest compression (in addition to assisted ventilation with BVM)
(a) Indications
i) Heart rate less than 60
ii) Heart rate between 60 and 80 and not increasing with adequate oxygenation
(b) Technique
i) Two finger technique
ii) Thumb technique
(c) Rate
i) 120 per minute

- (d) Depth
  - i) 1/2 - 3/4 inches
- (e) Compression-to-ventilation ratio
  - i) 3 compressions to 1 ventilation

c. Interventions
- (1) Temperature control
  - (a) Ambient air temperature control
  - (b) Dry with warm towel
    - i) Discard towel when it becomes wet
  - (c) Place naked infant on mother's skin; drape with warm blanket
  - (d) Wrap in dry, warm towel or blanket
  - (e) Stockinette
  - (f) Warm packs
    - i) Do not apply directly to infant
    - ii) Do not place wrapped infant on warm packs
- (2) Positioning
  - (a) On side
  - (b) Supine
    - i) Place towel roll under shoulders and thorax
  - (c) Mild Trendelenburg
    - i) Place towel roll under shoulders and thorax
- (3) Bradycardia
  - (a) blow by oxygen
  - (b) ventilation
- (4) Low blood volume

d. Transport consideration
- (1) Rapid transportation of the distressed infant
- (2) Position newborn on side to prevent aspiration

e. Psychological support/ communication strategies
- (1) Allow healthy newborn to bond with mother if possible

III. Specific situations

A. Meconium stained amniotic fluid

1. Epidemiology
   a. Incidence
      - (1) Approximately 10 - 15% of deliveries
   b. Morbidity/ mortality
      - (1) High mortality
      - (2) Hypoxemia
      - (3) Aspiration pneumonia
      - (4) Pneumothorax
      - (5) Pulmonary hypertension
2. Assessment findings
   a. Thin and watery
   b. Thick and particulate
      - (1) Dark green-black amniotic fluid
3. Management considerations for thick or particulate meconium
   a. Airway and ventilatory support
      - (1) Do not stimulate the infant to breathe
        - (a) Encircle the chest to prevent inhalation

(2) Oral suction until
(a) Airway is clear
(b) Infant breathes on own
(c) Bradycardia
(3) Ventilate with 100% oxygen
b. Circulatory support
(1) Assure adequate perfusion
c. Pharmacological interventions
(1) If hypotensive, administer fluid challenge
d. Non-pharmacological interventions
(1) Needle decompression may be required
(2) Hypothermia prevention
e. Transport consideration
(1) Identify facility to handle high-risk newborn
f. Psychological support/ communication strategies
(1) Do not discuss "chances of survival" with family
(2) Explain what is being done for the newborn

B. Bradycardia
1. Epidemiology
a. Incidence
(1) Most commonly caused by hypoxia
(2) Increased intracranial pressure
(3) Hypothyroidism
(4) Acidosis
b. Morbidity/ mortality
(1) Minimal risk if hypoxia is corrected quickly
c. Risk factors
(1)Treatment via pharmacological measures alone
2. Anatomy and physiology review
3. Pathophysiology
a. Primarily caused by hypoxia
4. Assessment findings
a. Assess upper airway for obstruction
(1) Secretions
(2) Tongue and soft tissue positioning
(3) Foreign body
b. Assess patient for hypoventilation
c. Palpate umbilical stump or brachial artery
5. Management considerations
a. Airway and ventilatory support
(1) Suction
(2) Positive pressure ventilation with 100% oxygen
b. Circulatory support
(1) Heart rate less than 100
(a) BVM ventilation with 100% oxygen and reassess
(2) Heart rate less than 60
(a) Begin chest compressions
(3) Heart rate between 60 and 80 but not responding to assisted ventilations with BVM
(a) Begin chest compressions

(4) Discontinue chest compressions when heart rate reaches 100
c. Non-pharmacological interventions
(1) Maintain temperature
d. Transport consideration
(1) Identify facility to handle high-risk newborn
e. Psychological support/ communication strategies
(1) Explain what is being done for the infant

C. Respiratory distress/ cyanosis
1. Pathophysiology
a. Lung or heart disease
b. Primary pulmonary hypertension
c. CNS disorders
d. Mucous obstruction of nasal passages
e. Spontaneous pneumothorax
f. Choanal atresia
g. Meconium aspiration
h. Amniotic fluid aspiration
i. Lung immaturity
j. Pneumonia
k. Shock and sepsis
l. Metabolic acidosis
m. Diaphragmatic hernia
n. Can lead to cardiac arrest
2. Assessment findings
a. Tachypnea
b. Paradoxical breathing
c. Periodic breathing
d. Intercostal retractions
e. Nasal flaring
f. Expiratory grunt
3. Management considerations
a. Airway and ventilatory support
(1) Suction
(2) High concentration oxygen
(3) BVM
b. Circulatory support
(1) Chest compressions if indicated
c. Non-pharmacological interventions
(1) Maintain normal body temperature
d. Transport consideration
e. Psychological support/ communication strategies
(1) Explain what is being done for the infant

D. Hypothermia
1. Body temperature drops below 35 degrees C
2. Epidemiology
a. Incidence
b. Morbidity/ mortality
(1) Infants may die of cold exposure at temperatures adults find comfortable
c. Risk factors
(1) Four methods of heat loss need to be controlled

(a) Evaporation
(b) Conduction
(c) Convection
(d) Radiation

3. Assessment findings
   a. Pale color
   b. Cool to touch, particular in extremities
   c. Acrocyanosis
   d. Respiratory distress
   e. Apnea
   f. Bradycardia
   g. Central cyanosis
   h. Irritability initially
   i. Lethargy in late stage
   j. Generally do not shiver
4. Management considerations
   a. Airway and ventilatory support
      (1) Assure adequate oxygenation and ventilation
   b. Circulatory support
      (1) Perform chest compressions if indicated
   c. Pharmacological interventions
      (1) Warm IV fluids
   d. Non-pharmacological interventions
      (1) Environmental conditions should be 24 to 26.5 degrees C
      (2) Warm hands prior to touching patient
   e. Transport consideration
      (1) Identify facility to handle high-risk newborn
   f. Psychological support/ communication strategies
      (1) Explain what is being done for the infant

IV. Resuscitation and post resuscitation and stabilization
   A. Epidemiology
      1. Incidence
         a. Primarily related to hypoxia
      2. Morbidity/ mortality
         a. Outcome is poor if interventions are not initiated quickly
         b. Increased likelihood of brain and organ damage
      3. Risk factors
         a. Intrauterine asphyxia
         b. Prematurity
         c. Drugs administered to or taken by the mother
         d. Congenital neuromuscular diseases
         e. Congenital malformations
         f. Intrapartum hypoxemia
   B. Anatomy and physiology review
   C. Pathophysiology
      1. Primary apnea
      2. Secondary apnea
      3. Bradycardia
      4. Persistent fetal circulation

5. Pulmonary hypertension

D. Assessment findings
   1. Peripheral cyanosis
   2. Inadequate respiratory effort
   3. Ineffective or absent heart rate

E. Management considerations
   1. Airway and ventilatory support
      a. Assure adequate oxygenation and ventilation
         (1) Blow-by oxygenation is required if peripheral cyanosis is present and despite adequate respiratory effort and heart rate greater than 100 beats/ min
         (2) Ventilations are required if respiratory effort is inadequate, ineffective, or absent or heart rate is less than 80 beats/ min
         (3) Ventilate at a rate of 40 to 60 breaths per minute
         (4) Administer a tidal volume sufficient to expand the chest
   2. Chest compressions are indicated if pulse is less than 60 beats/ min, or between 60 and 80 beats/ min and not improving despite assisted ventilations with BVM
      a. Suction airway thoroughly
   3. Circulatory support
      a. Perform chest compression
         (1) Depth of ½ to 3/4 inches
         (2) Rate of 120 compressions per minute
         (3) Ratio of 3 compressions to one ventilation
         (4) Pause to intersperse ventilation
   4. Non-pharmacological interventions
      a. Maintain normal body temperature
   5. Transport consideration
      a. Identify facility to handle high-risk newborn
   6. Psychological support/ communication strategies

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UNIT TERMINAL OBJECTIVE

6-3 At the completion of this unit, the EMT-Intermediate student will be able utilize assessment findings to formulate a field impression and implement the treatment plan for a pediatric patient.

COGNITIVE OBJECTIVES

At the completion of this unit, the EMT-Intermediate student will be able to:

6-3.1 Identify methods/ mechanisms that prevent injuries to infants and children. (C-1)
6-3.2 Identify the growth and developmental characteristics of infants and children. (C-2)
6-3.3 Identify anatomy and physiology characteristics of infants and children. (C-2)
6-3.4 Describe techniques for successful assessment of infants and children. (C-1)
Identify the common responses of families to acute illness and injury of an infant or child. (C-1)
6-3.5 Describe techniques for successful interaction with families of acutely ill or injured infants and children. (C-1)
6-3.6 Outline differences in adult and childhood anatomy and physiology. (C-3)
6-3.7 Discuss pediatric patient assessment. (C-1)
6-3.8 Identify "normal" age group related vital signs. (C-1)
6-3.9 Discuss the appropriate equipment utilized to obtain pediatric vital signs. (C-1)
6-3.10 Determine appropriate airway adjuncts for infants and children. (C-1)
6-3.11 Discuss complications of improper utilization of airway adjuncts with infants and children. (C-1)
6-3.12 Discuss appropriate ventilation devices for infants and children. (C-1)
6-3.13 Discuss complications of improper utilization of ventilation devices with infants and children. (C-1)
6-3.14 Discuss appropriate endotracheal intubation equipment for infants and children. (C-1)
6-3.15 Identify complications of improper endotracheal intubation procedure in infants and children. (C-1)
6-3.16 Define respiratory distress. (C-1)
6-3.17 Define respiratory failure. (C-1)
6-3.18 Define respiratory arrest. (C-1)
6-3.19 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for respiratory distress/ failure in infants and children. (C-1)
6-3.20 Discuss the pathophysiology of respiratory distress/ failure in infants and children. (C-1)
6-3.21 Discuss the assessment findings associated with respiratory distress/ failure in infants and children. (C-1)
6-3.22 Discuss the management/ treatment plan for respiratory distress/ failure in infants and children. (C-1)
6-3.23 List the indications for gastric decompression for infants and children. (C-1)
6-3.24 Differentiate between upper and lower airway obstruction. (C-2)
6-3.25 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for croup in infants and children. (C-1)
6-3.26 Discuss the pathophysiology of croup in infants and children. (C-1)
6-3.27 Discuss the assessment findings associated with croup in infants and children. (C-1)
6-3.28 Discuss the management/ treatment plan for croup in infants and children. (C-1)
6-3.29 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for foreign body aspiration in infants and children. (C-1)
6-3.30 Discuss the pathophysiology of foreign body aspiration in infants and children. (C-1)
6-3.31 Discuss the assessment findings associated with foreign body aspiration in infants and children. (C-1)
6-3.32 Discuss the management/ treatment plan for foreign body aspiration in infants and children. (C-1)
6-3.33 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for epiglottitis in infants and children. (C-1)
6-3.34 Discuss the pathophysiology of epiglottitis in infants and children. (C-1)
6-3.35 Discuss the assessment findings associated with epiglottitis in infants and children. (C-1)

6-3.36 Discuss the management/ treatment plan for epiglottitis in infants and children. (C-1)
6-3.37 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for asthma/bronchiolitis in infants and children. (C-1)
6-3.38 Discuss the pathophysiology of asthma/bronchiolitis in infants and children. (C-1)
6-3.39 Discuss the assessment findings associated with asthma/bronchiolitis in infants and children. (C-1)
6-3.40 Discuss the management/ treatment plan for asthma/bronchiolitis in infants and children. (C-1)
6-3.41 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for pneumonia in infants and children. (C-1)
6-3.42 Discuss the pathophysiology of pneumonia in infants and children. (C-1)
6-3.43 Discuss the assessment findings associated with pneumonia in infants and children. (C-1)
6-3.44 Discuss the management/ treatment plan for pneumonia in infants and children. (C-1)
6-3.45 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for foreign body lower airway obstruction in infants and children. (C-1)
6-3.46 Discuss the pathophysiology of foreign body lower airway obstruction in infants and children. (C-1)
6-3.47 Discuss the assessment findings associated with foreign body lower airway obstruction in infants and children. (C-1)
6-3.48 Discuss the management/ treatment plan for foreign body lower airway obstruction in infants and children. (C-1)
6-3.49 Discuss the common causes of shock in infants and children. (C-1)
6-3.50 Evaluate the severity of shock in infants and children. (C-3)
6-3.51 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for shock in infants and children. (C-1)
6-3.52 Discuss the pathophysiology of shock in infants and children. (C-1)
6-3.53 Discuss the assessment findings associated with shock in infants and children. (C-1)
6-3.54 Discuss the management/ treatment plan for shock in infants and children. (C-1)
6-3.55 Identify the major classifications of pediatric cardiac rhythms. (C-1)
6-3.56 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for cardiac dysrhythmias in infants and children. (C-1)
6-3.57 Discuss the pathophysiology of cardiac dysrhythmias in infants and children. (C-1)
6-3.58 Discuss the assessment findings associated with cardiac dysrhythmias in infants and children. (C-1)
6-3.59 Discuss the management/ treatment plan for cardiac dysrhythmias in infants and children. (C-1)
6-3.60 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for tachydysrythmias in infants and children. (C-1)
6-3.61 Discuss the pathophysiology of tachydysrythmias in infants and children. (C-1)
6-3.62 Discuss the assessment findings associated with tachydysrythmias in infants and children. (C-1)
6-3.63 Discuss the management/ treatment plan for tachydysrythmias in infants and children. (C-1)
6-3.64 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for bradydysrythmias in infants and children. (C-1)
6-3.65 Discuss the pathophysiology of bradydysrythmias in infants and children. (C-1)
6-3.66 Discuss the assessment findings associated with bradydysrythmias in infants and children. (C-1)
6-3.67 Discuss the management/ treatment plan for bradydysrythmias in infants and children. (C-1)
6-3.68 Discuss the primary etiologies of cardiopulmonary arrest in infants and children. (C-1)
6-3.69 Discuss basic cardiac life support (CPR) guidelines for infants and children. (C-1)
6-3.70 Identify appropriate parameters for performing infant and child CPR. (C-1)
6-3.71 Integrate advanced life support skills with basic cardiac life support for infants and children. (C-3)
6-3.72 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for seizures in infants and children. (C-1)
6-3.73 Discuss the pathophysiology of seizures in infants and children. (C-1)
6-3.74 Discuss the assessment findings associated with seizures in infants and children. (C-1)

6-3.75 Discuss the management/ treatment plan for seizures in infants and children. (C-1)
6-3.76 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for hypoglycemia in infants and children. (C-1)
6-3.77 Discuss the pathophysiology of hypoglycemia in infants and children. (C-1)
6-3.78 Discuss the assessment findings associated with hypoglycemia in infants and children. (C-1)
6-3.79 Discuss the management/ treatment plan for hypoglycemia in infants and children. (C-1)
6-3.80 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for hyperglycemia in infants and children. (C-1)
6-3.81 Discuss the pathophysiology of hyperglycemia in infants and children. (C-1)
6-3.82 Discuss the assessment findings associated with hyperglycemia in infants and children. (C-1)
6-3.83 Discuss the management/ treatment plan for hyperglycemia in infants and children. (C-1)
6-3.84 Discuss age appropriate vascular access sites for infants and children. (C-1)
6-3.85 Discuss the appropriate equipment for vascular access in infants and children. (C-1)
6-3.86 Identify complications of vascular access for infants and children. (C-1)
6-3.87 Identify common lethal mechanisms of injury in infants and children. (C-1)
6-3.88 Discuss anatomical features of children that predispose or protect them from certain injuries. (C-1)
6-3.89 Describe aspects of infant and children airway management that are affected by potential cervical spine injury. (C-1)
6-3.90 Identify infant and child trauma patients who require spinal immobilization. (C-1)
6-3.91 Discuss fluid management and shock treatment for infant and child trauma patient. (C-1)
6-3.92 Discuss the pathophysiology of trauma in infants and children. (C-1)
6-3.93 Discuss the assessment findings associated with trauma in infants and children. (C-1)
6-3.94 Discuss the management/ treatment plan for trauma in infants and children. (C-1)
6-3.95 Discuss the assessment findings and management considerations for pediatric trauma patients with the following specific injuries: head/neck injuries, chest injuries, abdominal injuries, extremities injuries, burns.
6-3.96 Define child abuse. (C-1)
6-3.97 Define child neglect. (C-1)
6-3.98 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for abuse and neglect in infants and children. (C-1)
6-3.99 Discuss the assessment findings associated with abuse and neglect in infants and children. (C-1)
6-3.100 Discuss the management/ treatment plan for abuse and neglect in infants and children. (C-1)
6-3.101 Define sudden infant death syndrome (SIDS). (C-1)
6-3.102 Discuss the parent/ caregiver responses to the death of an infant or child. (C-1)
6-3.103 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for SIDS infants. (C-1)
6-3.104 Discuss the pathophysiology of SIDS in infants. (C-1)
6-3.105 Discuss the assessment findings associated with SIDS infants. (C-1)
6-3.106 Discuss the management/ treatment plan for SIDS in infants. (C-1)

AFFECTIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

6-2.107 Demonstrate and advocate appropriate interactions with the infant/ child that conveys an understanding of their developmental stage. (A-3)
6-2.108 Recognize the emotional dependance of the infant/ child to their parent/ guardian. (A-1)
6-2.109 Recognize the emotional impact of the infant/ child injuries and illnesses on the parent/ guardian. (A-1)
6-2.110 Recognize and appreciate the physical and emotional difficulties associated with separation of the parent/ guardian of a special needs child (A-3)

6-2.111 Demonstrate the ability to provide reassurance, empathy and compassion for the parent/ guardian. (A-1)

PSYCHOMOTOR OBJECTIVES

At the completion of this unit, the EMT-Intermediate student will be able to:

6-3.112 Demonstrate the appropriate approach for treating infants and children. (P-2)
6-3.113 Demonstrate appropriate intervention techniques with families of acutely ill or injured infants and children. (P-2)
6-3.114 Demonstrate an appropriate assessment for different developmental age groups. (P-2)
6-3.115 Demonstrate appropriate technique for measuring pediatric vital signs. (P-2)
6-3.116 Demonstrate the use of a length-based resuscitation device for determining equipment sizes, drug doses and other pertinent information for a pediatric patient. (P-2)
6-3.117 Demonstrate the techniques/ procedures for treating infants and children with respiratory distress. (P-2)
6-3.118 Demonstrate proper technique for administering blow-by oxygen to infants and children. (P-2)
6-3.119 Demonstrate the proper utilization of a pediatric non-rebreather oxygen mask. (P-2)
6-3.120 Demonstrate appropriate use of airway adjuncts with infants and children. (P-2)
6-3.121 Demonstrate appropriate use of ventilation devices for infants and children. (P-2)
6-3.122 Demonstrate endotracheal intubation procedures in infants and children. (P-2)
6-3.123 Demonstrate appropriate treatment/ management of intubation complications for infants and children. (P-2)
6-3.124 Demonstrate proper placement of a gastric tube in infants and children. (P-2)
6-3.125 Demonstrate appropriate technique for insertion of peripheral intravenous catheters for infants and children. (P-2)
6-3.126 Demonstrate appropriate technique for administration of intramuscular, subcutaneous, rectal, endotracheal and oral medication for infants and children. (P-2)
6-3.127 Demonstrate appropriate technique for insertion of an intraosseous line for infants and children. (P-2)
6-3.128 Demonstrate age appropriate interventions for infants and children with an obstructed airway. (P-2)
6-3.129 Demonstrate appropriate airway control maneuvers for infant and child trauma patients. (P-2)
6-3.130 Demonstrate appropriate treatment of infants and children requiring advanced airway and breathing control. (P-2)
6-3.131 Demonstrate appropriate immobilization techniques for infant and child trauma patients. (P-2)
6-3.132 Demonstrate treatment of infants and children with head injuries. (P-2)
6-3.133 Demonstrate appropriate treatment of infants and children with chest injuries. (P-2)
6-3.134 Demonstrate appropriate treatment of infants and children with abdominal injuries. (P-2)
6-3.135 Demonstrate appropriate treatment of infants and children with extremity injuries. (P-2)
6-3.136 Demonstrate appropriate treatment of infants and children with burns. (P-2)
6-3.137 Demonstrate appropriate parent/ caregiver interviewing techniques for infant and child death situations. (P-2)
6-3.138 Demonstrate proper infant CPR. (P-2)
6-3.139 Demonstrate proper child CPR. (P-2)
6-3.140 Demonstrate proper techniques for performing infant and child defibrillation. (P-2)

DECLARATIVE

I. Introduction
- A. Epidemiology of EMS incidents involving pediatric patients
- B. Definitions
  1. Newborn
     - a. First few hours of life (perinatal period)
     - b. Resuscitation follows Neonatal Advanced Life Support (NALS) guidelines
  2. Infant
     - a. Neonatal period (first 28 days of life) is included
     - b. First month after birth to approximately 12 months of age
     - c. Resuscitation follows Pediatric Advanced Life Support (PALS) guidelines
  3. Toddler
     - a. A child between 12 and 36 months of age
  4. Preschool
     - a. A child between three and five years of age
  5. School age
     - a. The child between 6 and 12 years of age
  6. Adolescent
     - a. The period between the end of childhood and adulthood (18 years)
       - (1) Early (puberty)
       - (2) Middle (junior high school/ high school age)
       - (3) Late (high school/ college age)
     - b. End of childhood is usually defined as the beginning of puberty
       - (1) Highly child specific
       - (2) Male child average 13 years
       - (3) Female child average 11 years

II. Anatomy and physiology review
- A. Head
  1. Proportionally larger size
  2. Larger occipital region
  3. Fontanelles open in infancy
  4. Face is small in comparison to size of head
  5. EMT-Intermediate implications
     - a. Higher proportion of blunt trauma involves the head
     - b. Different airway positioning techniques
       - (1) Place thin layer of padding under back of seriously injured child < 3 years of age to obtain neutral position
       - (2) Place folded sheet under occiput of medically ill child < 3 years of age to obtain sniffing position
     - c. Examine fontanelle in infants
       - (1) Bulging fontanelle suggests increased intracranial pressure
       - (2) Sunken fontanelle suggests dehydration
- B. Airway
  1. Narrower at all age levels
  2. Infants are obligate nasal breathers
  3. Jaw is proportionally smaller in young children
  4. Larynx is higher (C 3-4) and more anterior

5. Cricoid ring is the narrowest part of the airway in young children
6. Tracheal cartilage softer
7. Trachea smaller in both length and diameter
8. Epiglottis
    a. Omega shaped in infants
    b. Extends at a 45 degree angle into airway
    c. Epiglottic folds have softer cartilage, therefore are more floppy, especially in infants
9. EMT-Intermediate implications
    a. Keep nares clear in infants < 6 months of age
    b. Narrower upper airways are more easily obstructed
        (1) Flexion or hyperextension
        (2) Particulate matter
        (3) Soft tissue swelling (injury, inflammation)
    c. Differences in intubation technique
        (1) Gentler touch
        (2) Straight blade
        (3) Lift epiglottis
        (4) Uncuffed tube
        (5) Precise placement

C. Chest and lungs
1. Ribs are positioned horizontally
2. Ribs are more pliable and offer less protection to organs
3. Chest muscles are immature and fatigue easily
4. Lung tissue is more fragile
5. Mediastinum is more mobile
6. Thin chest wall allows for easily transmitted breath sounds
7. EMT-Intermediate implications
    a. Infants and children are diaphragmatic breathers
    b. Infants and children are prone to gastric distention
    c. Rib fractures are less frequent but not uncommon in child abuse and trauma
    d. Greater energy transmitted to underlying organs following trauma, therefore, significant internal injury can be present without external signs
    e. Pulmonary contusions are more common in major trauma
    f. Lungs prone to pneumothorax following barotrauma
    g. Mediastinum has greater shift with tension pneumothorax
    h. Easy to miss a pneumothorax or misplaced intubation due to transmitted breath sounds

D. Abdomen
1. Immature abdominal muscles offer less protection
2. Abdominal organs are closer together
3. Liver and spleen proportionally larger and more vascular
4. EMT-Intermediate implications
    a. Liver and spleen more frequently injured
    b. Multiple organ injuries more common

E. Extremities
1. Bones are softer and more porous until adolescence
2. Injuries to growth plate may disrupt bone growth

3. EMT-Intermediate implications
    a. Immobilize any "sprain" or "strain" as it is likely a fracture
    b. Avoid piercing growth plate during intraosseous needle insertion

F. Skin and body surface area (BSA)
1. Thinner and more elastic
2. Thermal exposure results in deeper burn
3. Less subcutaneous fat
4. Larger surface area to body mass
5. EMT-Intermediate implications
    a. More easily and deeply burned
    b. Larger losses of fluid and heat

G. Respiratory system
1. Tidal volume proportionally similar to that of adolescents and adults
2. Metabolic oxygen requirements of infants and children are approximately double those of adolescents and adults
3. Proportionally smaller functional residual capacity, therefore proportionally smaller oxygen reserves
4. EMT-Intermediate implications
    a. Hypoxia develops rapidly because of increased oxygen requirements and decreased oxygen reserves

H. Cardiovascular system
1. Cardiac output is rate dependent in infants and small children
2. Vigorous but limited cardiovascular reserves
3. Bradycardia is a response to hypoxia
4. Can maintain blood pressure longer than an adult
5. Circulating blood volume is proportionally larger than in an adult
6. Absolute blood volume is smaller than in an adult
7. EMT-Intermediate implications
    a. Smaller absolute volume of fluid/ blood loss needed to cause shock
    b. Larger proportional volume of fluid/ blood loss needed to cause shock
    c. Hypotension is a late sign of shock
    d. A child may be in shock despite normal blood pressure
    e. Shock assessment is based upon clinical signs of tissue perfusion
    f. Carefully assess for shock if tachycardia is present
    g. Monitor carefully for development of hypotension

I. Nervous system
1. Develops throughout childhood
2. Developing neural tissue is more fragile
3. Brain and spinal cord are less well protected by skull and spinal column
4. EMT-Intermediate implications
    a. Brain injuries are more devastating in young children
    b. Greater force transmitted to underlying brain of young children
    c. Spinal cord injury can occur without spinal column injury

J. Metabolic differences
1. Infants and children have limited glycogen and glucose stores
2. Significant volume loss can result from vomiting and diarrhea
3. Prone to hypothermia due to increased body surface area
4. Newborns and neonates are unable to shiver to maintain body temperature

5. EMT-Intermediate implications
    a. Keep child warm during treatment and transport
    b. Cover the head to minimize heat loss

III. Assessment
A. General considerations
1. Many components of the initial patient evaluation can be done by observing the patient
2. Utilize the parent/ guardian to assist in making the infant or child more comfortable as appropriate
3. Interacting with parents and family
    a. Normal responses to acute illness and injury
    b. Parent/ guardian and child interaction
    c. Intervention techniques

B. Physical exam
1. Scene survey
    a. Observe the scene for hazards or potential hazards
    b. Observe the scene for mechanism of injury/ illness
        (1) Ingestion
            (a) Pills, medicine bottles, household chemicals, etc.
        (2) Child abuse
            (a) Injury and history do not coincide, bruises not where they should be for mechanism of injury, etc.
        (3) Position patient found
    c. Observe the parent/ guardian/ caregiver interaction with the child
        (1) Do they act appropriately
        (2) Is parent/ guardian/ caregiver concerned
        (3) Is parent/ guardian/ caregiver angry
        (4) Is parent/ guardian/ caregiver indifferent
2. Initial assessment
    a. The general impression
        (1) General impression of environment
        (2) General impression of parent/ guardian and child interaction
        (3) General impression of the patient/ Pediatric Assessment Triangle
            (a) A structure for assessing the pediatric patient
            (b) Focuses on the most valuable information for pediatric patients
            (c) Used to ascertain if any life-threatening condition exists
            (d) Components
                i) Appearance
                    a) Mental status
                    b) Muscle tone
                ii) Work of breathing
                    a) Respiratory rate
                    b) Respiratory effort
                iii) Circulation
                    a) Skin signs
                    b) Skin color
        (4) Initial triage decisions
            (a) Urgent - proceed with rapid ABC assessment, treatment, and

transport
(b) Non urgent - proceed with focused history, detailed physical exam after initial assessment

b. Vital functions
(1) Determine level of consciousness
(a) AVPU scale
i) Alert
ii) Responds to verbal stimuli
iii) Responds to painful stimuli
iv) Unresponsive
(b) Modified Glasgow Coma Scale
(c) Signs of inadequate oxygenation
(2) Airway
(a) Determine patency
(3) Breathing
(a) Adequate chest rise and fall
(b) Use of accessory muscles
(c) Nasal flaring
(d) Tachypnea
(e) Bradypnea
(f) Irregular breathing pattern
(g) Head bobbing
(h) Grunting
(i) Absent breath sounds
(j) Abnormal sounds
(4) Circulation
(a) Pulse
i) Central
ii) Peripheral
iii) Quality of pulse
(b) Blood pressure
i) Measuring blood pressure is not necessary in children < 3 years of age
(c) Skin color
(d) Active hemorrhage
(5) Vital signs in the pediatric patient
(a) Equipment
(b) Normal age appropriate ranges for:
i) Infant
ii) Toddler
iii) Preschool
iv) School aged
v) Adolescent
(c) Proper technique for obtaining the following in pediatric patients
i) pulse
ii) respirations
iii) blood pressure

3. Transition phase

a. Utilized to allow the infant or child to become familiar with you and your equipment
b. Use of transition phase depends on the seriousness of the patient's condition
c. For the conscious, non-acutely ill child
d. For the unconscious, non-acutely ill child do not perform the transition phase but proceed to the physical examination

4. Focused history
   a. Approach
      (1) For infant, toddler, and preschool age patient, obtain from parent/ guardian
      (2) For school age and young adolescent patient, most information may be obtained from the patient
      (3) For older adolescent patient, question the patient in private regarding sexual activity, pregnancy, illicit drug and alcohol use
   b. Content
      (1) Chief complaint
         (a) Nature of illness/ injury
         (b) How long has the patient been sick/ injured
         (c) Presence of fever
         (d) Effects on behavior
         (e) Bowel/ urine habits
         (f) Vomiting/ diarrhea
         (g) Frequency of urination
      (2) Past medical history
         (a) Infant or child under the care of a physician
         (b) Chronic illnesses
         (c) Medications
         (d) Allergies
5. Detailed physical exam
   a. Examine all body regions
      (1) Head-to-toe in older child
      (2) Toe-to-head in younger child
   b. Some or all of the following may be appropriate, depending on the situation
      (1) Pupils
      (2) Capillary refill
         (a) Normal - two seconds or less
         (b) Valuable to assess on patients less than six years of age
         (c) Less reliable in cold environment
         (d) Blanch nailbed, base of the thumb, sole of the feet
      (3) Hydration
         (a) Skin turgor
         (b) Sunken or flat fontanelle in an infant
         (c) Presence of tears and saliva
      (4) Pulse oximetry
         (a) Should be utilized on any moderately injured or ill infant or child
         (b) Hypothermia and shock can alter reading
      (5) Cardiac monitor
6. Ongoing Exam - continually monitor the following

(1) Respiratory effort
(2) Color
(3) Mental status
(4) Pulse oximetry
(5) Vital signs
(6) Patient temperature

C. General management
1. Airway management in pediatric patients
a. Basic airway management
(1) Manual positioning
(a) Allow medical patients to assume position of comfort
(b) Support under the torso for trauma patients less than 3 years old
(c) Occipital elevation for supine medical patients 3 years of age or older
(2) Foreign body airway obstruction - basic clearing methods
(a) Infants
i) Back blows
ii) Chest thrusts
(b) Children
i) Abdominal thrusts
(3) Suction
(a) Avoid hypoxia
(b) Avoid upper airway stimulation
(c) Decrease suction negative pressure (#100 mm/Hg) in infants
(4) Oxygenation
(a) Non-rebreather mask
(b) Blow-by oxygen if mask is not tolerated
(c) Utilize the parent or guardian to deliver oxygen if patient condition warrants
(d) Maintain proper head position
(5) Oropharyngeal airway
(a) Sizing
(b) Preferred method of insertion uses the tongue blade to depress the tongue and jaw
(6) Nasopharyngeal airway
(a) Sizing
(b) No major differences in sizing or use compared to adults
(7) Ventilation
(a) Bag size
(b) Proper mask fit
(c) Proper mask position and seal (E-C clamp)
(d) Ventilate at age appropriate rate (squeeze-release-release)
(e) Obtain chest rise with each breath
(f) Allow adequate time for exhalation
(g) Assess BVM ventilation
(h) Apply cricoid pressure to minimize gastric inflation and passive regurgitation
(i) Complications of improper technique or equipment

- b. Advanced airway management
  - (1) Foreign body airway obstruction - advanced clearing method
    - (a) Direct laryngoscopy with Magill forceps
    - (b) Attempt intubation around foreign body
  - (2) Endotracheal intubation in pediatric patients
    - (a) Laryngoscope and appropriate size blades
      - i) Length based resuscitation tape to determine size
      - ii) Straight blade is preferred
    - (b) Appropriate size endotracheal tube and stylette
      - i) Sizing methods
        - a) Length based resuscitation tape
        - b) Numerical formulas
        - c) Anatomical clues
      - ii) Stylette placement
    - (c) Technique for pediatric intubation
    - (d) Depth of insertion
    - (e) Endotracheal tube securing device
    - (f) Complications of improper technique
  - (3) Gastric decompression

2. Circulation
   - a. Vascular access
     - (1) Intraosseous access in children < 6 years of age in cardiac arrest or if intravenous access fails
   - b. Fluid resuscitation
     - (1) 20 ml/kg of lactated ringer's or normal saline bolus as needed
3. Pharmacological
4. Non-pharmacological
   - a. Cervical spine immobilization for traumatic cause
5. Transport considerations
   - a. Appropriate mode
     - (1) Transport should not be delayed to perform procedures that can be done en route
     - (2) Proper BLS care must be performed prior to any ALS interventions
   - b. Appropriate facility
     - (1) The availability of a receiving hospital with expertise in pediatric care may improve the patient's outcome
6. Psychological support/ communication strategies
   - a. Utilize the parent/ guardian to assist in making the infant or child more comfortable
   - b. Encourage parents to help calm the child during painful procedures
   - c. Infants, toddlers, preschool and school aged patients do not like to be separated from parent/ guardian
   - d. Infants and children have a natural fear of strangers; for stable patients, allow them to become accustomed to you before your hands-on assessment
   - e. Give some control of what is going to happen to the patient (which arm to have their IV)
   - f. When possible and practical, physically position your face at the same level as the patient's face to facilitate communication and minimize fear

g. Use age-appropriate vocabulary
h. Keep patient warm
i. Allow child to take their favorite toy/ blanket if possible
j. Permit the child to express their feelings (e.g., fear, pain, crying)
k. Let the child know that certain physical actions (e.g., hitting, biting, spitting) are not permitted

IV. Specific pathophysiology, assessment and management
A. Respiratory compromise
1. Introduction
a. Epidemiology
b. Categories of respiratory compromise
(1) Upper airway obstruction
(2) Lower airway disease
2. Pathophysiology
a. Respiratory illnesses cause respiratory compromise in airway/ lung
(1) Severity of respiratory compromise depends on extent of respiratory illness
(2) Approach to treatment depends on severity of respiratory compromise
b. Severity
(1) Respiratory distress
(a) Increased work of breathing
(b) Carbon dioxide tension in the blood initially decreases, then increases as condition deteriorates
(c) If uncorrected, respiratory distress leads to respiratory failure
(2) Respiratory failure
(a) Inadequate ventilation or oxygenation
(b) Respiratory and circulatory systems are unable to exchange enough oxygen and carbon dioxide
(c) Carbon dioxide tension in the blood increases, leading to metabolic acidosis
(d) Very ominous condition; patient is on the verge of respiratory arrest
(3) Respiratory arrest
(a) Cessation of breathing
(b) Failure to intervene will result in cardiopulmonary arrest
(c) Good outcomes can be expected with early intervention that prevents cardiopulmonary arrest
c. Assessment
(1) Chief complaint
(2) History
(3) Physical findings
(a) Signs and symptoms of respiratory distress
i) Normal mental status ==> irritability or anxiety
ii) Tachypnea
iii) Retractions
iv) Nasal flaring
v) Good muscle tone

vi) Tachycardia
vii) Head bobbing
viii) Grunting
ix) Cyanosis which improves with supplemental oxygen
(b) Signs and symptoms of respiratory failure
i) Irritability or anxiety ==> lethargy
ii) Marked tachypnea ==> bradypnea
iii) Marked retractions ==> agonal respirations
iv) Poor muscle tone
v) Marked tachycardia ==> bradycardia
vi) Central cyanosis
(c) Signs and symptoms of respiratory arrest
i) Obtunded ==> coma
ii) Bradypnea ==> apnea
iii) Absent chest wall motion
iv) Limp muscle tone
v) Bradycardia ==> asystole
vi) Profound cyanosis
(4) Ongoing assessment - improvement indicated by
(a) Improvement in color
(b) Improvement in oxygen saturation
(c) Increased pulse rate
(d) Increased level of consciousness
d. Management
(1) Graded approach to treatment
(2) Consider separating parent and child
(3) Airway support
(a) Manage upper airway obstructions as needed
(b) Insert airway adjunct if needed
(4) Ventilatory and oxygenation support
(a) Respiratory distress/ early respiratory failure
i) Administer high flow oxygen
(b) Late respiratory failure/ respiratory arrest
i) BVM - ventilate patient with 100% oxygen via age-appropriate sized bag
ii) ETT - intubate patient if positive pressure ventilation does not rapidly improve patient condition
iii) Consider gastric decompression if abdominal distention is impeding ventilation
(5) Circulatory support
(a) Consider IV or IO
(6) Pharmacologic interventions
(7) Non-pharmacologic interventions
(8) Transport considerations
(a) Appropriate mode
(b) Appropriate facility
(9) Psychological support/ communication strategies
3. Upper airway obstruction

a. Croup
   (1) Pathophysiology
      (a) An inflammatory process of the upper respiratory tract involving the subglottic region
      (b) Most commonly seen in infants and children between 6 months and 4 years of age
      (c) Main cause is viral infection of the upper airway
      (d) Another form is spasmodic croup
         i) Occurs mostly in the middle of the night
         ii) Usually without prior upper respiratory infection
   (2) Assessment
      (a) Signs and symptoms of respiratory distress or failure, depending on severity, plus
         i) Appears sick
         ii) Stridor
         iii) Barking (seal- or dog-like) or brassy cough
         iv) Hoarseness
         v) Fever (+/-)
      (b) History
         i) Usually with history of upper respiratory infection in classic croup (1-2 days)
         ii) Rarely progresses to respiratory failure
   (3) Management
      (a) Airway and ventilatory support
         i) Humidified or nebulized oxygen
         ii) Cool mist oxygen at 4 - 6 L/min
      (b) Circulatory support
      (c) Pharmacological interventions
      (d) Non-pharmacological interventions
         i) Keep child in position of comfort
      (e) Transport considerations
      (f) Psychological support/ communication strategies
         i) Do not agitate the infant or child (no IV's, blood pressure, etc.)
         ii) Keep the parent/ guardian/ caregiver with the infant or child if appropriate

b. Foreign body aspiration
   (1) Pathophysiology
      (a) Partial or complete blockage of the upper airway by a foreign body
      (b) Most common in toddlers and preschool (1-4 years of age) but can occur at any age
      (c) Objects are usually food (hard candy, nuts, seeds, hot dog) or small objects (coins, balloons)
      (d) If no interventions or if interventions are unsuccessful, respiratory arrest followed by cardiopulmonary arrest will ensue
      (e) Partial
         i) Most children show signs of mild distress

ii) Appears anxious, but not toxic
iii) Interventions other than oxygen and transport may precipitate complete obstruction

(f) Complete
i) Most children show signs of severe distress
ii) Appears agitated, but not toxic
iii) If no interventions, respiratory arrest ensues, followed by cardiopulmonary arrest

(2) Assessment
(a) Partial obstruction
i) Signs and symptoms of respiratory distress or failure depending on severity, plus
a) Appears irritable or anxious, but not toxic
b) Inspiratory stridor
c) Muffled or hoarse voice
d) Drooling
e) Pain in throat
ii) History
a) Usually a history of choking if observed by adult
(b) Complete obstruction
i) Signs and symptoms of respiratory failure or arrest, depending on severity, plus
a) Appears agitated or lethargic
b) No or minimal air movement
ii) History
a) History often lacking
b) Inability to ventilate despite proper airway positioning

(3) Management
(a) Airway and ventilatory support
i) Partial obstruction
a) Place patient in sitting position
b) Deliver oxygen by non-rebreather mask or blow-by
c) DO NOT ATTEMPT TO LOOK IN MOUTH
d) Interventions other than oxygen and transport may precipitate complete obstruction
ii) Complete obstruction
a) Open airway and attempt to visualize the obstruction
b) Sweep visible obstructions with your finger (do NOT perform blind finger sweeps)
c) Perform BLS foreign body airway obstruction (FBAO) maneuvers
d) Attempt BVM ventilations
e) Perform laryngoscopy if BVM is unsuccessful
f) Remove object if possible with pediatric Magill forceps

g) Intubate if possible
h) Continue BLS FBAO maneuvers if ALS unsuccessful

(b) Circulatory support
(c) Pharmacological interventions
(d) Non-pharmacological interventions
(e) Transport considerations
i) Notify hospital of patient status
ii) Transport expeditiously
(f) Psychological support/ communication strategies
i) Do not agitate patient
a) No IV's or medications
b) Do not look in patient's mouth
ii) Keep caregiver with child, if appropriate

c. Epiglottitis
(1) Pathophysiology
(a) Rapidly forming cellulitis of the epiglottis and its surrounding structures
(b) Most common in children between 3 and 7 years of age but can occur at any age
(c) Bacterial infection, usually Hemophilus influenza type B
(d) Increasingly uncommon due to the H-flu vaccine
(e) Can be a true life-threatening emergency
(2) Assessment
(a) Signs and symptoms of respiratory distress or failure, depending on severity, plus
i) Appears agitated, sick
ii) Stridor
iii) Muffled voice
iv) Drooling
v) Sore throat
vi) Pain on swallowing
vii) High fever
(b) History
i) Usually no previous history, but a rapid onset of symptoms (6-8 hours)
(c) Can quickly progress to respiratory arrest
(3) Management
(a) Airway and ventilatory support
i) NEVER ATTEMPT TO VISUALIZE THE AIRWAY IF THE PATIENT IS AWAKE
ii) Allow the parent to administer oxygen
iii) If airway becomes obstructed, two rescuer ventilation with BVM is almost always effective
iv) If BVM is not effective, attempt intubation with stylet in place
v) Should not be attempted in settings with short transport times

vi) Performing chest compression upon glottic visualization during intubation may produce a bubble at the tracheal opening

(b) Circulatory support
(c) Pharmacological interventions
(d) Non-pharmacological interventions
(e) Transport considerations
    i) Allow patient to assume position of comfort
    ii) Notify hospital of patient status early
    iii) Transport to the hospital without delay, keeping child warm
(f) Psychological support/ communication strategies
    i) DO NOT AGITATE THE PATIENT - no IV's, BP, do not look in patient's mouth
    ii) Keep the parent/ caregiver with the child if appropriate

4. Lower airway disease
   a. Asthma/ bronchiolitis
      (1) Pathophysiology
         (a) Bronchospasm, excessive mucous production, inflammation of the small airways
         (b) Typically in child with known history of asthma
         (c) Triggered by upper respiratory infections, allergies, changes in temperature, physical exercise, and emotional response
         (d) Children that experience prolonged asthma attacks tire easily; watch for signs of failure
      (2) Assessment
         (a) Signs and symptoms - signs of respiratory distress or failure depend on severity, plus
            i) Appears anxious
            ii) Wheezes
            iii) Prolonged expiratory phase
            iv) A silent chest means danger
         (b) History
         (c) Bronchiolitis and asthma may present very similarly, however, albuterol will not improve bronchiolitis but it will also not harm the patient
      (3) Management
         (a) Airway and ventilatory support
            i) Administer oxygen by tolerated method
            ii) BVM ventilations for respiratory failure/ arrest (progressive lethargy, poor muscle tone, shallow respiratory effort)
            iii) Endotracheal intubation for respiratory failure/ arrest with, prolonged BVM ventilations or inadequate response to BVM ventilations
         (b) Circulatory support
         (c) Pharmacological interventions
            i) Albuterol nebulizer

ii) Subcutaneous epinephrine 1:1000 - only with severe respiratory distress or failure
iii) Medications can be repeated if no effect
(d) Non-pharmacological interventions
(e) Transport considerations
i) Allow patient to assume position of comfort
(f) Psychological support/ communication strategies
i) Keep parent/ caregiver with child if appropriate

b. Pneumonia
(1) Pathophysiology
(a) Infection of the lower airway and lung
(b) Most common in infants, toddlers and preschoolers (1 - 5 years of age), but can occur at any age
(c) Very common disease process
(d) May be caused by bacteria or virus
(2) Assessment
(a) Signs and symptoms - signs of respiratory distress of failure, depending on the severity, plus
i) Appears anxious
ii) Decreased breath sounds
iii) Rales
iv) Rhonchi (localized or diffuse)
v) Pain in the chest
vi) Fever
(b) History
i) Usually a history of lower respiratory infectious symptoms
(3) Management
(a) Airway and ventilatory support
i) Administer oxygen by tolerated method
ii) BVM ventilations for respiratory failure/ arrest (progressive lethargy, poor muscle tone, shallow respiratory effort)
iii) Endotracheal intubation for respiratory failure, prolonged BVM ventilations, or inadequate response to BVM ventilations
(b) Circulatory support
i) Consider IV or IO
(c) Pharmacological interventions
(d) Non-pharmacological interventions
(e) Transport considerations
i) Allow patient to assume position of comfort
(f) Psychological support/ communication strategies
i) Keep parent/ caregiver with child if appropriate

c. Foreign body lower airway obstruction
(1) Pathophysiology
(a) Foreign body in the lower airway or lung
(b) Rarely progresses rapidly to respiratory failure or arrest

(c) Objects are usually food (nuts, seeds, etc.) or small objects
(2) Assessment
(a) Signs and symptoms - signs of respiratory distress or failure, depending on the severity, plus
i) Appears anxious
ii) Decreased breath sounds
iii) Rales
iv) Rhonchi (localized or diffuse)
v) Pain in the chest
(b) History
i) May be a history of choking if witnessed by an adult
(3) Management
(a) Airway and ventilatory support
i) Administer oxygen by tolerated method
ii) Consider intubation
(b) Circulatory support
i) Consider IV or IO
(c) Pharmacological interventions
(d) Non-pharmacological interventions
(e) Transport considerations
i) Allow patient to assume position of comfort
(f) Psychological support/ communication strategies
i) Keep parent/ caregiver with child if appropriate

B. Shock
1. Pathophysiology
a. An abnormal condition characterized by inadequate delivery of oxygen and metabolic substrates to meet the metabolic demands of tissues
b. Severity
(1) Compensated (early)
(a) Patient’s blood pressure is normal although signs of inadequate tissue perfusion are present
(b) Reversible
(2) Decompensated (late)
(a) Hypotension and signs of inadequate organ perfusion are present
(b) Often irreversible
c. Assessment
(1) Chief complaint
(2) History
(3) Physical findings
(a) Signs and symptoms compensated shock
i) Irritability or anxiety
ii) Tachycardia
iii) Tachypnea
iv) Weak peripheral pulses, full central pulses
v) Delayed capillary refill
vi) Cool, pale extremities

vii) Systolic blood pressure within normal limits
viii) Decreased urinary output
(b) Signs and symptoms of decompensated shock
i) Lethargy or coma
ii) Marked tachycardia or bradycardia
iii) Marked tachypnea or bradypnea
iv) Absent peripheral pulses, weak central pulses
v) Markedly delayed capillary refill
vi) Cool, pale, dusky,mottled extremities
vii) Hypotension
viii) Markedly decreased urinary output
2. Etiology
a. Hypovolemia - common
(1) Pathophysiology
(a) Dehydration
i) Vomiting
ii) Diarrhea
iii) Excessive respiratory excursions
iv) Excessive perspiration
(b) Blood loss
i) Trauma
ii) Child abuse
a) Other, e.g., GI bleed
(2) Signs and symptoms -assess for general compensated or decompensated shock plus
(a) Dehydration
i) Poor skin turgor
ii) Decreased saliva and/ or tears
iii) Sunken fontanelle (infants)
iv) Dry mucosa
(3) Treatment
(a) Compensated
i) Oxygen
(b) Decompensated
i) Airway and ventilation
a) High flow oxygen
b) Consider intubation
ii) Circulation
a) Consider IV or IO
b) 20 ml/kg of LR or NS bolus as needed
iii) Transport considerations
iv) Psychological support/ communication strategies
a) Allow patient to assume position of comfort
(c) Cervical spine immobilization for trauma
(4) Distributive - uncommon
(a) Etiology
i) Sepsis
ii) Neurogenic

iii) Anaphylactic
(b) Pathophysiology
i) Peripheral pooling due to loss of vasomotor tone
ii) Shift of fluid from intravascular space to extravascular space
(c) Signs and symptoms - assess for general compensated or decompensated shock plus
i) Sepsis
a) Early - warm skin
b) Late - cool skin
ii) Neurogenic
a) Warm skin
b) Bradycardia
iii) Anaphylactic
a) Allergic rash
b) Airway swelling
(d) Treatment
i) Compensated
a) Oxygen
ii) Decompensated
a) Airway and ventilation
b) High flow oxygen
c) Consider intubation
iii) Circulation
a) Consider IV or IO
b) 20 ml/kg of LR or NS bolus as needed
iv) Transport considerations
v) Psychological support communication strategies
a) Allow patient to assume position of comfort

3. Cardiogenic shock
a. Pathophysiology
(1) An abnormal condition characterized by inadequate delivery of oxygen and metabolic substrates to meet the metabolic demands of tissues
(a) Mechanical pump failure
(b) Usually biventricular
b. Assessment
(1) Signs and symptoms of compensated or decompensated shock, depending on severity, plus
i) Rales
ii) Jugular venous distention
iii) Hepatomegaly
iv) Peripheral edema
(2) History
c. Treatment
(1) Airway and ventilation
(a) High flow oxygen
i) Consider intubation
(b) Circulation

i) Consider IV or IO
ii) 20 ml/kg of LR or NS bolus as needed
(c) Pharmacological
i) Consider adenosine if tachyarrhythmia-induced
(d) Transport considerations
(e) Psychological support/ communication strategies
i) Allow patient to assume position of comfort

C. Dysrythmias
1. Tachydysrhythmias
a. Supraventricular tachycardia
(1) Assessment
(a) Signs and symptoms - signs of compensated or decompensated shock, plus
i) Narrow complex tachycardia rates greater than 220 beats per minute
ii) Poor feeding
iii) Hypotension
(2) Management
(a) Stable - supportive care
(b) Unstable
i) Airway and ventilatory support
a) Oxygen
ii) Circulatory support
iii) Pharmacological interventions
a) Consider adenosine
iv) Non-pharmacological interventions
v) Transport considerations
vi) Psychological support/ communication strategies
b. Ventricular tachycardia with a pulse
(1) Assessment
(a) Signs and symptoms - signs of compensated or decompensated shock, depending on severity, plus
a) Rapid, wide complex tachycardia
b) Poor feeding
c) Hypotension
(b) History
(2) Management
(a) Stable - supportive care
(b) Unstable
i) Airway and ventilatory support
a) High flow oxygen
ii) Circulatory support
iii) Pharmacological interventions
a) Consider lidocaine
iv) Non-pharmacological interventions
v) Transport considerations
vi) Psychological support/ communication strategies
2. Bradydysrhythmias

a. Epidemiology
   (1) Incidence- most common dysrhythmia in children
b. Pathophysiology
   (1) Usually develops as a result of hypoxia
   (2) May develop due to vagal stimulation (rare)
c. Assessment
   (1) Signs and symptoms - compensated or decompensated shock, depending on severity, plus
      (a) Bradycardia
      (b) Slow, narrow complex heart rhythm, QRS duration may be normal or prolonged
   (2) History
d. Management
   (1) Stable - supportive care
   (2) Unstable
      (a) Airway and ventilatory support
         i) Ventilate patient with 100% oxygen via BVM
         ii) Intubate patient if poor response to BVM ventilations
      (b) Circulatory support
         i) Perform chest compressions if oxygen does not increase heart rate
      (c) Pharmacological interventions
         i) Medications can be given down the endotracheal tube
         ii) Administer epinephrine
         iii) Administer atropine for vagally induced bradycardia
      (d) Non-pharmacological interventions
      (e) Transport considerations
      (f) Psychological support/ communication strategies

3. Absent rhythm
   a. Asystole
      (1) Epidemiology
         (a) Incidence - may be the initial cardiac arrest rhythm
      (2) Assessment
         (a) Signs and symptoms
            i) Pulseless
            ii) Apneic
            iii) Cardiac monitor indicating no electrical activity
         (b) History
      (3) Management
         (a) Confirm in two ECG leads
         (b) Airway and ventilatory support
            i) Ventilate the patient with 100% oxygen via BVM
            ii) Intubate patient if poor response to BVM ventilations
         (c) Circulatory support
            i) Perform chest compressions
         (d) Pharmacological interventions
            i) Medications can be given down the endotracheal tube
            ii) Administer epinephrine

(e) Non-pharmacological interventions
(f) Transport considerations
(g) Psychological support/ communication strategies

b. Pulseless electrical activity
(1) Pathophysiology
(a) Pneumothorax
(b) Cardiac tamponade
(c) Hypovolemia
(d) Hypoxia
(e) Acidosis
(f) Hypothermia
(g) Hypoglycemia
(2) Assessment
(a) Signs and symptoms
i) Pulseless
ii) Apneic
iii) Cardiac monitor indicating organized electrical activity
(b) History
(3) Management
(a) Resuscitation should be directed toward relieving cause
(b) Airway and ventilatory support
i) Ventilate the patient with 100% oxygen via BVM
ii) Intubate patient
(c) Circulatory support
i) Perform chest compressions
(d) Pharmacological interventions
i) Medications can be given down the endotracheal tube
ii) Administer epinephrine
(e) Non-pharmacological interventions
(f) Transport considerations
(g) Psychological support/ communication strategies

D. Seizure
1. Pathophysiology
a. Types
(1) Generalized
(2) Focal
2. Assessment
a. Signs and symptoms
(1) Generalized
(a) Sudden jerking of both sides of the body followed by tenseness and relaxation of the body
(b) Loss of consciousness
(2) Focal
(a) Sudden jerking of a part of the body (arm, leg)
(b) Lip smacking
(c) Eye blinking
(d) Staring
(e) Confusion

(f) Lethargy
b. History
3. Management
a. Airway and ventilatory support
(1) Maintain patent airway
(2) Administer high flow oxygen
b. Circulatory support
c. Pharmacological interventions
(1) Consider dextrose if hypogylcemic
(2) Consider benzodiazepine if active seizures are present; anticipate need for ventilatory support
d. Non-pharmacological interventions
(1) Protect patient from further injury
(2) Protect head and cervical spine if injury has occurred
e. Transport considerations
f. Psychological support/ communication strategies

E. Hypoglycemia
1. Pathophysiology
a. Children have limited glucose storage
b. In severe cases, if not treated promptly, can cause brain damage
2. Assessment
a. Signs and symptoms
(1) Mild
(a) Hunger
(b) Weakness
(c) Tachypnea
(d) Tachycardia
(2) Moderate
(a) Sweating
(b) Tremors
(c) Irritability
(d) Vomiting
(e) Mood swings
(f) Blurred vision
(g) Stomach ache
(h) Headache
(i) Dizziness
(3) Severe
(a) Decreased level of consciousness
(b) Seizure
b. Measure blood glucose
c. History
3. Management
a. Airway and ventilatory support
b. Circulatory support
c. Pharmacological interventions
(1) Administer Dextrose per medical direction
(2) Repeat blood glucose test 10-15 minutes after dextrose infusion

d. Non-pharmacological interventions
e. Transport considerations
f. Psychological support/ communication strategies

F. Hyperglycemia
1. Pathophysiology
a. Leads to dehydration and ketoacidosis
2. Assessment
a. Signs and symptoms
(1) Early
(a) Increased thirst
(b) Increased urination
(c) Weight loss
(2) Acute (dehydration and early ketoacidosis)
(a) Weakness
(b) Abdominal pain
(c) Generalized aches
(d) Loss of appetite
(e) Nausea
(f) Vomiting
(g) Signs of dehydration except decreased urinary output
(h) Fruity breath odor
(i) Tachypnea
(j) Hyperventilation
(k) Tachycardia
(3) If untreated, progresses to
(a) Coma
(b) Deep and slow respirations (Kussmaul)
(c) Signs of severe dehydration
3. Management
a. Airway and ventilatory support
b. Circulatory support
c. Pharmacological interventions
(1) Consider lactated ringers or NS if signs of dehydration are present per medical direction
d. Non-pharmacological interventions
e. Transport considerations
f. Psychological support/ communication strategies

V. Pediatric Trauma
A. Pathophysiology
1. Blunt
a. Thinner body wall allows forces to be readily transmitted to body contents
b. Predominant cause of injury in children
2. Penetrating
a. Becoming an increasing problem in adolescents
b. Higher incidence in the inner city (mostly intentional), but significant incidence in other areas (mostly unintentional)
B. Mechanism of injury

1. Fall
   a. Single most common cause of injury in children
   b. Serious injury or death resulting from truly accidental falls is relatively uncommon unless from a significant height
   c. Prevention strategies
2. Motor vehicle crash
   a. Leading cause of permanent brain injury and new cases of epilepsy
   b. Leading cause of death and serious injury in children
   c. Prevention strategies
3. Pedestrian vehicle crash
   a. Particularly lethal form of trauma in children
   b. Initial injury due to impact with vehicle (extremity/ trunk)
   c. Child is thrown from force of impact causing additional injury (head/ spine) upon impact with other objects (ground, another vehicle, light standard, etc.)
   d. Prevention strategies
4. Near-drowning
   a. Third leading cause of injury or death in children between birth and 4 years of age
   b. Causes approximately 2000 deaths annually
   c. Severe, permanent brain damage occurs in 5-20% of hospitalized children for near drowning
   d. Prevention strategies
5. Penetrating injuries
   a. Risk of death from firearm injuries increases with age
   b. Stab wounds and firearm injuries account for approximately 10-15% of all pediatric trauma admissions
   c. Visual inspection of external injuries cannot evaluate the extent of internal involvement
   d. Prevention strategies
6. Burns
   a. The leading cause of accidental death in the home for children under the age of 14 years
   b. Burn survival is a function of burn size and concomitant injuries
   c. Modified “rule of nines” is utilized to determine percentage of surface area involved
   d. Prevention strategies
7. Physical abuse
   a. Classified into four categories: physical abuse, sexual abuse, emotional abuse, and child neglect
   b. Social phenomena such as increased poverty, domestic disturbance, younger aged parents, substance abuse, and community violence have been attributed to increase of abuse
   c. Document all pertinent findings, treatments, and interventions
   d. Prevention strategies

C. Special considerations
1. Airway control
   a. Maintain in-line stabilization in neutral, not sniffing, position
   b. Administer 100% oxygen to all trauma patients
   c. Patent airway must be maintained via suctioning and jaw thrust

d. Be prepared to assist ineffective respirations
e. Intubation should be performed when the airway remains inadequate
f. Gastric tube should be placed after intubation

2. Immobilization
   a. Indications for stabilization and immobilization of cervical spine
   b. Utilize appropriate-sized pediatric immobilization equipment
      (1) Rigid cervical collar
      (2) Towel/ blanket roll
      (3) Child safety seat
      (4) Pediatric immobilization device
      (5) Vest-type/ short wooden backboard
      (6) Long backboard
      (7) Straps, cravats
      (8) Tape
      (9) Padding
   c. Maintain supine neutral in-line position for infants, toddlers, and pre-schoolers by placing padding from the shoulders to the hips
3. Fluid management
   a. Management of the airway and breathing take priority over management of circulation because circulatory compromise is less common in children than adults
   b. Vascular access
      (1) Large-bore IV catheter should be inserted into a large peripheral vein
      (2) Do not delay transport to gain access
      (3) Intraosseous access in children less than 6 years of age if IV access fails
      (4) Initial fluid bolus of 20 ml/kg of lactated ringers or NS
      (5) Reassess vital signs and rebolus with 20 ml/kg if no improvement
      (6) If improvement does not occur after the second bolus, there is likely to be significant blood loss and the need for rapid surgical intervention
4. Traumatic brain injury
   a. Early recognition and agressive managemetn can reduce morbidity and mortality
   b. Severity
      (1) Mild - GCS is 13 to 15
      (2) Moderate - GCS is 9 to 12
      (3) Severe - GCS is less than or equal to 8
   c. Signs of increased intracranial pressure
      (1) Elevated blood pressure
      (2) Bradycardia
      (3) Slow, deep respirations (Kussmaul) progressing to slow deep respirations alternating with rapid deep respirations (Cheyne-Stokes)
      (4) Buldging fontanelle (infant)
   d. Signs of herniation
      (1) Asymmetrical pupils
      (2) Posturing
   e. Specific management
      (1) Administer high concentration of oxygen for mild to moderate head injuries (GCS 9-15)
      (2) Intubate and ventilate at normal breathing rate with 100% oxygen for severe head injuries (GCS 3-8)

(a) Use of lidocaine may blunt rise in ICP (controversial)

(3) Indications for hyperventilation

(a) Asymmetric pupils

(b) Active seizures

(c) Neurologic posturing

D. Specific injuries

1. Head and neck injury
   a. Larger relative mass of the head and lack of neck muscle strength provides increased momentum in acceleration-deceleration injuries and a greater stress to the cervical spine region
   b. Fulcrum of cervical mobility in the younger child is at the C2-C3 level
   c. 60% to 70% of pediatric fractures occur in C1 or C2
   d. Head injury is the most common cause of death in pediatric trauma victim
   e. Diffuse injuries are common in children, focal injuries are rare
   f. Soft tissues, skull and brain are more compliant in children than in adults
   g. Due to open fontanelles and sutures, infants up to an average age of 16 months may be more tolerant to an increase of intracranial pressure and can have delayed signs
   h. Subdural bleeds in a infant can produce hypotension (extremely rare)
   i. Significant blood loss can occur through scalp lacerations and should be controlled immediately
   j. The Modified Glasgow Coma Score should be utilized for infants and young children
2. Chest injury
   a. Chest injuries in children under 14 years of age are usually the result of blunt trauma
   b. Due to the compliance of the chest wall, severe intrathoracic injury can be present without signs of external injury
   c. Tension pneumothorax is poorly tolerated and is an immediate threat to life
   d. Flail segment is an uncommon injury in children; when noted without a significant mechanism of injury, suspect child abuse
   e. Many children with cardiac tamponade will have no physical signs of tamponade other then hypotension
3. Abdominal injury
   a. Musculature is minimal and poorly protects the viscera
   b. Organs most commonly injured are liver, kidney, and spleen
   c. Onset of symptoms may be rapid or gradual
   d. Due to the small size of the abdomen, be certain to palpate only one quadrant at a time
   e. Any child who is hemodynamically unstable without evidence of obvious source of blood loss should be considered as having an abdominal injury until proven otherwise
4. Extremity
   a. Relatively more common in children than adults
   b. Growth plate injuries are common
   c. Compartment syndrome is an emergency in children
   d. Any sites of active bleeding must be controlled
   e. Splinting should be performed to prevent further injury and blood loss
   f. PASG may be useful in unstable pelvic fractures with hypotension

5. Burns
   a. Thermal
   b. Chemical
   c. Electrical
   d. Management priorities
      (1) Prompt management of the airway is required as swelling can develop rapidly
      (2) If intubation is required, an endotracheal tube up to two sizes smaller than what would normally be used may be required
      (3) Thermally-burned children are very susceptible to hypothermia; maintain normal body temperature
      (4) Suspect musculoskeletal injuries in electrical burn patients and perform spine immobilization techniques

VI. Sudden Infant Death Syndrome (SIDS)
   A. Epidemiology
      1. Risk factors
         a. Occurs most frequently in the fall and winter months
         b. Minor illness (cold or upper respiratory infection) within two weeks prior to the death
         c. Premature and low birth-weight infants
         d. Infants of young mothers
         e. Infants of mothers who did not receive prenatal care
         f. Infants of mothers who used cocaine, methadone, or heroin during pregnancy
      2. Prevention strategies
   B. Pathophysiology
      1. Sudden and unexpected death of a seemingly healthy infant which remains unexplained even after a thorough postmortem examination
      2. No prior symptoms of life-threatening illness
      3. Death usually occurs during sleep
      4. No definitive answer at this time
      5. A small percentage is abuse related
      6. Many victims of SIDS appear to have suffered from long-term underventilation of the lungs, possibly due to poor control of breathing during sleep; prone positioning may be a factor
      7. Abnormalities in the brainstem
   C. Assessment
      1. Signs and symptoms
         a. No external signs of injury
         b. Lividity
         c. Frothy blood-tinged drainage from nose/ mouth
         d. Rigor mortis
         e. Evidence that the baby was very active just prior to the death (i.e., rumpled bed clothes, unusual position or location in the bed)
      2. History
   D. Management
      1. Airway and ventilatory support
      2. Circulatory support
      3. Pharmacological interventions

4. Non-pharmacological interventions
5. Transport considerations
6. Psychological support/ communication strategies
    a. Initiate CPR unless the infant is obviously dead (unquestionably dead to a lay person)
    b. Perform ALS as indicated
    c. Be prepared for the range of possible family emotional reactions
    d. Parents/ caregiver should be allowed to accompany the baby in the ambulance
    e. Explain that certain information regarding the infant's health is necessary to determine the care to be given
    f. Utilize the baby's name
    g. Questions should be phrased so blame is not implied
    h. Debriefing
    i. Resources for SIDS families

VII. Child abuse and neglect
- A. Epidemiology
    1. Second leading cause of death in infants less than 6 months of age
    2. Between 2,000 and 5,000 children die each year due to abuse and neglect
- B. Age considerations
    1. Under 18 years of age
    2. Physically or mentally handicapped person under 21 years of age
- C. Abuse or neglect perpetrators
    1. Parent, legal guardian, foster parent
    2. Person, institution, agency, or program having custody of the child
    3. Person serving as a caretaker (i.e., babysitter)
- D. Abuse
    1. Types
        a. Physical
        b. Emotional
        c. Sexual
    2. Abuse indicators
        a. Historical
        b. Psychosocial
        c. Signs of physical abuse
        d. Signs of emotional abuse
            (1) Physical indicators
            (2) Behavioral indicators
        e. Signs of sexual abuse
- E. Neglect
    1. Types
        a. Physical
        b. Emotional
    2. Neglect indicators
        a. Behavioral
        b. Physical
- F. EMT-Intermediate role in treating abuse and neglect
    1. Assess the injuries/ neglect and render appropriate care
    2. Look at the environment for condition and cleanliness

3. Look for evidence of anything out of the ordinary
4. Look and listen to caregiver/ family members
5. Assess whether the explanation fits the injury
6. Document all findings thoroughly
7. Report suspicion
    a. Mandated reporter
    b. Immunity from liability

G. Resources for abuse and neglect
1. State, regional, and local child protection agency
2. Hospital social service department

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UNIT TERMINAL OBJECTIVE

6-4 At the completion of this unit, the EMT-Intermediate student will be able to use assessment findings to formulate a management plan for the geriatric patient.

COGNITIVE OBJECTIVES

At the completion of this lesson, the EMT-Intermediate student will be able to:

6-4.1 Describe dependent and independent living environments. (C-1)
6-4.2 Identify local resources available to assist the elderly and discuss strategies to refer at-risk patients to appropriate community services. (C-1)
6-4.3 Discuss expected physiological changes associated with aging. (C-1)
6-4.4 Describe common psychological reactions associated with aging. (C-1)
6-4.5 Discuss problems with mobility in the elderly. (C-1)
6-4.6 Discuss problems with continence and elimination. (C-1)
6-4.7 Describe communication strategies used to provide psychological support. (C-1)
6-4.8 Discuss factors that may complicate the assessment of the elderly patient. (C-1)
6-4.9 Discuss common complaints, injuries, and illnesses of elderly patients. (C-1)
6-4.10 Discuss pathophysiology changes associated with the elderly in regards to drug distribution, metabolism, and elimination. (C-2)
6-4.11 Discuss the impact of polypharmacy, dosing errors, medication non-compliance, and drug sensitivity on patient assessment and management. (C-1)
6-4.12 Discuss various body system changes associated with age. (C-1)
6-4.13 Discuss the assessment and management of the elderly patient with complaints related to the following body systems: (C-1)
- Respiratory
- Cardiovascular
- Nervous
- Endocrine
- Gastrointestinal

6-4.14 Describe the assessment of nervous system diseases in the elderly, including cerebral vascular disease, delirium, dementia, Alzheimer's disease and Parkinson's disease. (C-1)
6-4.15 Discuss the assessment of an elderly patient with gastrointestinal problems, including GI hemorrhage and bowel obstruction. (C-1)
6-4.16 Discuss the normal and abnormal changes with age related to toxicology. (C-1)
6-4.17 Discuss the assessment of the elderly patient with complaints related to toxicology. (C-1)
6-4.18 Describe the assessment and management of the elderly patient with toxicological problems. (C-1)
6-4.19 Discuss the assessment and management of the patient with environmental considerations. (C-1)
6-4.20 Discuss the normal and abnormal changes of the musculoskeletal system with age. (C-1)
6-4.21 Discuss the assessment and management of the elderly patient with complaints associated with trauma. (C-1)

AFFECTIVE OBJECTIVES

At the completion of this unit, the EMT-Intermediate student will be able to:

6-4.22 Demonstrate and advocate appropriate interactions with the elderly that convey respect for their position in life. (A-3)
6-4.23 Recognize and appreciate the many impediments to physical and emotional well being in the elderly. (A-2)

PSYCHOMOTOR OBJECTIVES

At the completion of this unit, the EMT-Intermediate student will be able to:

6-4.24 Demonstrate the ability to assess a geriatric patient. (P-2)
6-4.25 Demonstrate the ability to apply assessment findings to the management plan for a geriatric patient. (P-3)

DECLARATIVE

I. Introduction
- A. Geriatrics is a population with special and varying needs
- B. Demographics
  - 1. Increasing older adult population
- C. Societal issues
  - 1. Social issues
    - a. Society's view of aging
    - b. Isolation
  - 2. Living environments
    - a. Independent living
      - (1) Spouse/ family support
      - (2) Visiting nursing
    - b. Dependent living
      - (1) Live-in nursing care
      - (2) Assisted living environments
      - (3) Nursing homes
  - 3. Financial aspects
  - 4. Ethics
    - a. Advanced directives
- D. Referral resources
  - 1. National, state, local

II. Common Problems
- A. Problems with mobility and falls
  - 1. Physical effects of decreased mobility
    - a. Poor nutrition
    - b. Difficulty with elimination
    - c. Circulation
    - d. Skin integrity
    - e. Predisposes patients to falls and injury
  - 2. Psychological effect of decreased mobility
    - a. Loss of independence
    - b. Loss of confidence
    - c. Feeling "old"
  - 3. Risk factors for falls
    - a. History of falls
    - b. Dizziness, weakness, impaired vision
    - c. Altered gait
    - d. CNS problems/ decreased mental status
    - e. Medications
  - 4. Prevention strategies
    - a. Use of assistive devices
    - b. Modify the environment
- B. Problems with sensations
  - 1. Vision
    - a. Visual changes begin at age 40 and problems increase gradually
      - (1) Cataracts
      - (2) Glaucoma

2. Hearing
    a. Hearing loss
        (1) Impairs the ability to communicate
        (2) Hearing aids may not restore hearing to normal
3. Speech
    a. Word retrieval
    b. Decreased fluency of speech
    c. Slowed rate of speech
    d. Change in voice quality
4. Pain perception
    a. Alterations for sensory deficits
    b. Non specific complaints
    c. Decreased ability to detect changes

C. Problems with continence and elimination
1. Incontinence
    a. Incontinence is never normal
    b. Involves urinary or bowel
        (1) Decrease in bladder capacity
        (2) Involuntary bladder contractions
        (3) Decreased ability to postpone voiding
        (4) Medications may affect bladder/ bowel control
    c. Mild to total
    d. Extremely embarrassing
    e. Can lead to skin irritation or urinary tract infection
2. Elimination
    a. Causes of difficulty in urination
        (1) Enlargement of the prostate in men
        (2) Urinary tract infections
        (3) Acute or chronic renal failure
    b. Causes of difficulty in bowel elimination
        (1) Diverticular disease
        (2) Constipation
        (3) Colorectal cancer

D. Concomitant disease process

III. General assessment

A. Patience is important

B. General health assessment
1. Social history
2. Environment
    a. Ability for self care
3. Social support system
4. Activity level
5. Medication history
    a. Prescription medications
    b. Non-prescription medications
6. Nutrition
    a. Overall health is greatly affected by nutrition
    b. Malnutrition causes dehydration and hypoglycemia
7. Sleep and rest

C. Communicating with the elderly patient
   1. Use proper verbal and nonverbal communication strategies
   2. Locate patient hearing aid or eyeglasses if needed
   3. Turn on lights
   4. Preserve dignity
   5. Always explain before you do
   6. Supportive strategies
      a. Encourage patient to express feelings
      b. Avoid questions which are judgmental
      c. Confirm what the patient says
      d. Take responsibility for communication breakdown

D. History
   1. Common medical complaints

E. Physical exam
   1. Mental status assessment

F. Factors complicating assessment
   1. Multiple diseases/ complaints
   2. Absence of classical symptoms
   3. Failure to relate symptoms
   4. Sensory alterations
   5. Polypharmacy

IV. General management
   A. Airway and ventilation
   B. Circulation
   C. Pharmacological
      1. Pharmacological concerns
         a. Older adults are more sensitive to drugs
         b. Experience prolonged drug effects
         c. Have more adverse reactions
         d. Polypharmacy
         e. Many chronic illnesses
         f. Medication interaction
            (1) Proper dosing is very important due to
               (a) Less lean body mass
               (b) Low fluid reserve
               (c) Slow metabolism
               (d) Decreased renal and hepatic function
   D. Non-pharmacological
   E. Transport considerations
      1. Position of comfort
      2. Gentle handling
      3. Extra padding
   F. Psychological support

V. Specific system pathophysiology, assessment, and management
   A. Respiratory System
      1. Changes with age
         a. Decreased lung function due to
            (1) Chronic exposure to pollutants

(2) Decreased respiratory muscle tone
(3) Changes in alveolar/ capillary exchange
(4) Respiratory center changes

b. Most common pulmonary diseases in the elderly
(1) Pneumonia
(a) Leading cause of death in the elderly
(2) Pulmonary embolism
(a) Mortality is high due to difficulty in diagnosis
(3) Obstructive airway diseases
(a) Combined bronchitis and emphysema in patients with a long history of smoking

2. Assessment
a. History
(1) Smoking
(2) Home oxygen use
(3) Medications
(4) Breathing difficulty
(a) Physical exam
(b) Wheezing / prolonged expiratory phase
(c) Breath sounds unreliable

3. Management

B. Cardiovascular system
1. Changes with age
a. Arteries become increasingly rigid
b. Decreased peripheral resistance
c. Reduced blood flow to all organs
d. Increased blood pressure
e. Widened pulse pressure
f. Heart muscle stiffens
g. Increased incidence of postural hypotension
h. Increased atherosclerosis throughout the body
i. The heart increases in size

2. Assessment
a. History
(1) Cardiovascular fitness
(2) Changes in exercise tolerance
(3) Recent diet history
(4) Medications
(5) Smoking
(6) Breathing difficulty, especially at night
(7) Palpitations, flutter, skipped beats

b. Physical exam
(1) Hypertension and orthostatic hypotension
(2) Dependent edema
(3) Consider checking the blood pressure in both arms
(4) Check pulses in all extremities routinely
(5) Check for dehydration
(6) Chest pain is less common in the elderly
(7) Dyspnea is the most common sign in patients over 85
(8) PVC’s are present in most adults over 80

3. Management
    a. Conditions
    b. Dysrhythmias

C. Nervous system
1. Changes with age
    a. Cognition requires perceptual organs and the brain
    b. Cognitive function is not affected by the normal aging process
    c. Slight changes in the following are normal
        (1) Difficulty with recent memory
        (2) Psychomotor slowing
        (3) Forgetfulness
        (4) Decrease in reaction time
2. Assessment
    a. Best if conducted over time
    b. Ask family or caretakers for information to determine the progression
    c. Focus on the patient's perceptions, thought processes, and communication
    d. Provide an environment with minimal distractions
    e. Mental status/ cognitive functioning exam
        (1) Be calm, unhurried
        (2) Ask clear, direct questions
        (3) Give the patient time to respond
        (4) Establish normal patterns of behavior and changes in behavior
        (5) Include ability to perform activities of daily living
        (6) Look for patterns of behavior over time
        (7) Assess the patient's mood and affective or emotional state
    f. Assess for
        (1) Weakness
        (2) Chronic fatigue
        (3) Changes in sleep patterns
        (4) Syncope or near syncope
    g. Management

D. Endocrine system
1. Diabetes
    a. Approximately 20% of older adults have diabetes
    b. Almost 40% have some impaired glucose tolerance
    c. Most commonly type II
2. Thyroid diseases
3. Assessment
4. Management

E. Gastrointestinal system
1. Conditions
    a. Hiatal hernia
    b. GI hemorrhage
        (1) Increased risk
    c. Bowel obstruction
2. Assessment
    a. Look for indication of malnutrition
3. Management

F. Common medical conditions
    a. Stroke

(1) Transient ischemic attack

b. Delirium
   (1) Organic brain dysfunction
   (2) Potentially reversible, if caught early
   (3) Can progress into chronic mental dysfunction
   (4) Possible causes
      (a) Tumor
      (b) Metabolic disorders
      (c) Fever
      (d) Drug reaction
      (e) Alcohol intoxication/ withdrawal
   (5) Assessment
      (a) Acute onset of anxiety
      (b) Unable to focus
      (c) Unable to think logically or maintain attention
      (d) Memory is intact

c. Dementia
   (1) Increases with age
   (2) Half of nursing home patients have some form of dementia
   (3) Generally considered irreversible
   (4) Patient becomes dependent on others
   (5) Causes include
      (a) Strokes
      (b) Genetic or viral factors
      (c) Alzheimer’s
   (6) Assessment
      (a) Progressive disorientation
      (b) Shortened attention span
      (c) Aphasia, nonsense talking
      (d) Hallucinations
      (e) Caretaker exhaustion
      (f) Severely limits ability to communicate

d. Alzheimer’s disease
   (1) Pathophysiology
   (2) Assessment

e. Parkinson’s disease
   (1) Pathophysiology
   (2) Assessment

VI. Special considerations
   A. Toxicology considerations
      1. Decreased kidney function alters elimination
      2. Increased likelihood of CNS side effects
      3. Altered GI absorption
      4. Decreased liver blood flow alters metabolism and excretion
      5. Substance abuse
         a. Common problem
         b. Stress is a factor
         c. Polypharmacy
         d. Assessment

(1) Often very subtle signs
(2) Small amounts of alcohol can cause intoxications
(3) Mood swings, denial, and hostility
(4) Question family and friends
(5) Confusion
(6) History of falls
(7) Anorexia
(8) Insomnia
(9) Vision and memory changes
(10) Poor dexterity

e. Management requires identification and referral

B. Environmental considerations
1. Hypothermia in the elderly
2. Hyperthermia in the elderly
3. Prevention strategies

C. Trauma considerations
1. Bones fracture with mild trauma
a. Osteoporosis and muscle weakness increase likelihood of fractures
b. Susceptible to stress fractures of femur, pelvis, tibia
c. Hip fracture is the most common acute orthopedic condition
2. Reduced cardiac reserve decreases the ability to compensate for blood loss
3. Head injuries are more serious
a. Brain shrinkage allows brain to move
b. Subdural hematoma may develop more slowly
4. Burn injuries are more serious
a. Increased severity due to pre-existing disease
b. Skin changes result in increased burn depth
c. Decreased defense against infection
5. Slower healing
6. Mortality rates markedly increased
7. Post injury disability more common
8. Assessment
a. Fractures can be occult due to diminished pain perception
b. Observe scene for clues of abuse
9. Management
a. Immobilization
(1) Packaging should include bulk, and padding to fill in areas
(2) Kyphosis may require extra padding under the shoulders to maintain alignment
b. Dentures may need to be removed
c. Oxygen is very important due to vascular disease
d. Monitor fluid administration for signs/ symptoms of pulmonary edema
e. Prevent hypothermia by keeping patient warm
f. ECG monitoring is indicated due to increased cardiac disease
g. Transportation
(1) Appropriate mode
(2) Appropriate facilities
h. Psychological support/ communications strategies